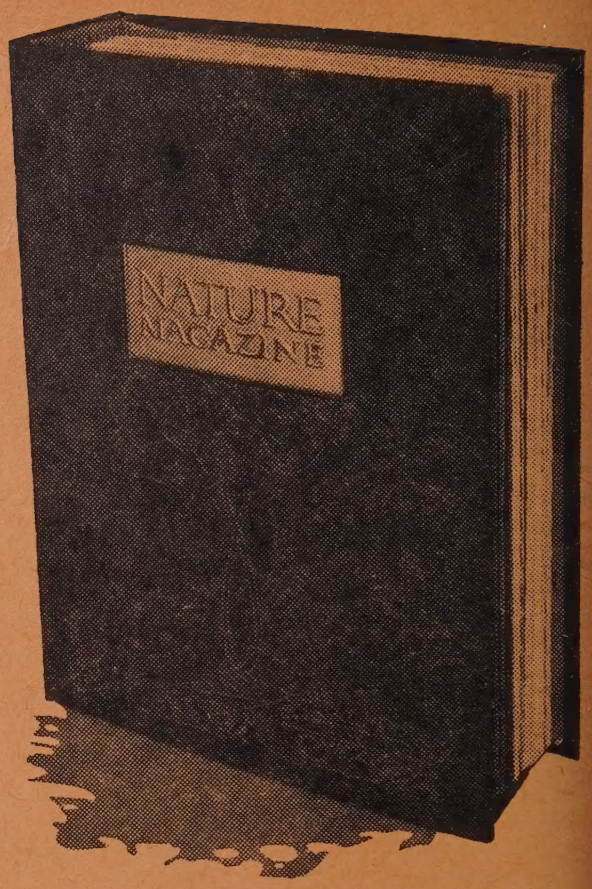
Nature Magazine

VOLUME 34 NUMBER 9

NOVEMBER 1941

35 CENTS

Keep a Year's Issues of NATURE MAGAZINE in this Handsome Binder



"Where's the latest copy of Nature Magazine?" How often you have heard that question! And how often an answer like this: "Look on the chair . . . over in the corner!" Like as not, the much desired copy will turn up under the cushion in the window seat. And great will be the lament at torn pages and creased pictures.

Unlike most magazines, Nature Magazine is the sort you want to keep. Naturally issues accumulate. There's an easy solution to the problem of mislaid copies, unsightly disorganized piles of magazines. Get one of these binders specially prepared for Nature Magazine.

Just slip in the copies of Nature Magazine as they arrive. Snap them in with the little unbreakable hooked wire. This binding device while light is strong and sturdy, guaranteed to withstand all ordinary usage. The copies may be removed as easily as they are inserted. At the end of the year, remove the year's copies and have them bound. Your binder is then ready to serve another year, accommodating each issue as it arrives.

Always Protected and Right at Hand

This binder looks and handles like a book. It is a bound book in every respect except that you snap the magazines in the cover one at a time. It opens flat as a bound book, which makes it easy to handle and to read. It keeps the magazines handy for a year—or as long as you wish to retain them in the binder. Meanwhile the contents are protected from handling, tearing and from being mislaid or carried away. The binder is finely grained, dark green, gold embossed . . . a handsome addition to desk or library.

← Opens Flat like a book

This De Luxe Binder only $2

Your name stamped in gold for 50c extra

Send for your binder today before this copy of your magazine gets mislaid. We are so sure you will like this binder that we guarantee to refund your money if you are not entirely satisfied. Use the coupon here or, if you prefer, write us your order so as to avoid cutting the magazine.

AMERICAN NATURE ASSOCIATION
1214 Sixteenth St., N. W.
Washington, D. C.

Send me_____of your De Luxe Binders for NATURE MAGAZINE, for which I enclose (check, P. O. Money Order) for $_____

*Name*_____

*Street and No.*_____

*City and State*_____

Stamp my name in Gold for the 50c extra. Be sure to get it right, as printed below.

WITH you, as with us, *defense comes first*. Our output of optical instruments is being rapidly increased to meet the defense emergency. We will endeavor to give our customers the best service possible under existing circumstances, and ask your sympathetic cooperation.

THE challenge of the War Department finds one answer in the words Edward Bausch when he says, "My ociates and myself have obligated company to a program that eclipses magnitude and speed all previous rts."

This pledge is underlined and italid three times every twenty-four rs by the long lines of workers in each nge of shift. Every resource and facigained in filling the diverse optical needs of education, research and industry is being concentrated in maintaining an unbroken flow of optical instruments to America's front lines of defense and to America's defense industries.

Many are the Bausch & Lomb products that help to "keep 'em flying." There are bubble octants for aerial navigation; photo lenses for mapping and reconnaissance, height finders, searchlight mirrors and flank-spotting scopes for anti-aircraft defense; binoculars for spotters; Ray-Ban Glasses for fliers.

The accepted optical aids to industry developed by Bausch & Lomb—the Contour Measuring Projector, the Metallographic Equipment, the B & L Littrow Spectrograph—are now in the first line of production, doing important work in keeping them flying.

BAUSCH & LOMB

OPTICAL CO. • ROCHESTER, NEW YORK

ESTABLISHED 1853

MANUFACTURERS OF PRECISION OPTICAL GLASS AND INSTRUMENTS FOR NATIONAL DEFENSE, EDUCATION, RESEARCH, INDUSTRY AND EYESIGHT CORRECTION

Camera Trails

BY NORRIS W. HARKNESS

Christmas Cards

If you wait until the last minute to make your photographic Christmas cards, or if you are going to slap them out without trying to make them the best examples of your ability, you would do better to buy them. However, if you want to send cards that will be unlike any others your friends will receive, a personal greeting that carries something of yourself with it, then make them photographically.

The process is as simple as contact printing once you have set up your negatives in a mask. Undoubtedly the card sets commercially available at prices from a dollar up are the most convenient things to use, but they have rather stereotyped greetings and are too widely used. Why not write your own version of what you have to say with India ink on a smooth white card and then photograph that on Process film that gives the greatest contrast? If you do not have the necessary copying apparatus, and do not want to use the method outlined here some months ago to utilize your enlarger for the purpose, you can take the message to your local dealer or commercial photographer and have him make the copy just the size you want to fit your card.

Or—and I've received several cards done this way—why not make the contact print on the upper part of the card and leave space for a written individual greeting on each one? You might also cover the unwanted parts of the greeting from one of the sets and leave room for your inked signature and personal word showing, perhaps, only the "Merry Christmas" of the original.

But a word on the kind of negative you use for the picture part of the card. Christmas is a religious and sentimental holiday, despite the way we have commercialized it, and your card—or so it seems to me—ought to be Christmassy in the old fashioned meaning of the word and show either something pertaining to the season, or a more personal picture of the family or the home. The cute vacation picture and some of the other tricky and non-appropriate rather than inappropriate subjects that you see so often have something in common with the comic postcard. Maybe I'm wrong, and you are the sole judge of what to use, but remember that the picture may be around for a long time to be seen by many people who do not know you or appreciate the unexpressed idea behind that one shot.

Whatever you use, the method is the same. The two negatives—the picture and the greeting—are fastened into the mask with the dull emulsion side away from the light. Lay the mask on a table with the front down and then put the negatives, emulsion side up, on the mask, fastening them there with scotch tape. When they are in place, look at the face of the mask to be sure the negatives are in the right way, for that is how the card will look. If you made your own mask, be sure the edges of the openings are square with their edges parallel to those of the card, and then paste thicker cardboard strips where the edges of the cards will go to serve as guides in placing the paper during the printing.

From that point the procedure is just that of contact printing. The exposures are made after test to determine the correct exposure time and a number may be printed before you develop the batch. Develop and fix them carefully, and then wash them at least an hour in running water while you move them occasionally to keep them from sticking together. To dry them, the Eastman blotter roll is the simplest thing, but you can lay them face down on clean towels and cover them with another. Leave them there until they are nearly dry and then stack them under pressure.

Before they are bone dry, you may want to emboss them. The sets contain a gadget for the purpose, but you can cut a card a half-inch smaller than your whole cards—a half-inch each way—and paste it to a glass. With a light behind the glass you can see when you have centered the card properly on the smaller one—the photograph should be face down—and then run the end of a toothbrush handle around the edge of the little one. Even pressure of the embossing tool—it may be the toothbrush handle, or the round end of a knitting needle, or any other round object—will indent the card to a depth equal to the thickness of the pasted one and give the finished cards a professional look. But work carefully. A poorly executed photographic card is no compliment to the receiver or the maker. If the card is not right, throw it away and make another. They are inexpensive and grand when you have done a good job on them.

Here is a tip. Get your card paper now from your dealer and get the envelopes at the same time. You may have trouble in getting them if you wait too long.

Tree Series

We write songs about trees, some cut initials in the trunks, and many use them for backgrounds, but why not a thorough series of all the trees that grow in your area? It will make good study material as well as interesting pictures, and doing it will be fun, too.

Such pictures ought to include specimens of all the varieties around you, and they should show the kind of ground most natural to them—the leaves, the bark, the formation of the entire tree, and how they look in all seasons. Any time will do to start such a series, of course, and you will find as you go along that you do not want to stop. You will not be satisfied with just any shot of one oak and may find another that has a better outline or that can be photographed better without interference from its neighbors.

But you will find it easier to plan the shots ahead as well as you can from your knowledge of the varieties available and where they may be found. If, for example, you simply start shooting trees whenever you find an attractive one, you will be surprised at the number of duplications in your file, and the vacancies in it too. Better, pick out some one tree and follow it through, or on an outing prepare ahead to bring home leaves from certain kinds to be photographed in the more convenient darkroom-studio where the wind does not blow and where the lights are under control.

When you get them home, show their formation and markings and how they are attached to the twig or branch and get them properly marked. Perhaps you will have to have help in determining the varieties, but be sure your data are correct. It might happen that some Nature teacher will want to use your shots in her class work.

Then photograph each tree in side lighting from an angle that eliminates as far as possible the other trees near it. Show how it looks in early spring when the leaves are in bud; in summer at the height of the green foliage; in autumn with the full color of the first frost; and in winter when the branches are bare.

Put the shots of the one tree together and give each its caption that will not only tell about that one print but carry on the story of the series. We have already talked about the specialized techniques needed for each part of the photography and you know more than you need for the job. The biggest need is to get it started—and now is the best time. It might be that Camera Trails will run a contest for such series pictures some day—who knows?

The Problem Corner

C.R.L., Eastport, Maine, asks: "What should I do about bottles of developing solutions that have stood in my darkroom all summer? The D-72 for prints seems discolored, but the stop bath, hypo and Panthermic for films seem all right. Can I use them?"

ANS.—Any developer that seems to have changed its color at all has undoubtedly begun to deteriorate and should be thrown away. The brown color comes from the oxidation of the developing agents and, while it would probably develop prints, it would not give the real brilliance that makes a good print. Panthermic 777 lasts a long time, but should be discarded as soon as the color becomes at all reddish; the same applies to the replenisher. The stop bath is almost surely past its prime, and the hypo ought to be tested by leaving a bit of film in it to see how long is needed for the milkiness to disappear. If it is more than eight or nine minutes, throw that out, too. The cost of chemicals is so small that it is a shame to take a chance of spoiling well exposed negatives by using any that are less than perfect. Better safe than sorry.

Miss E.G.T., Eustis, Florida, writes: "I have a number of prints that have yellow stains in the corners although the rest of the print area is as usual. What might cause them and how can I remove them?"

ANS.—Although I cannot be certain from your description, I think the stains came from too long development and occur where your warm fingers rested in the emulsion. Check on whether they are not on the corners you handle—then use tongs after this or touch less of the print and try to handle different corners each time. There is no good way to get them off since they are dyed gelatine that is practically indelible. Trim the prints or make new ones.

G.M., Sherwood, Michigan, says: "I exposed twenty rolls of film at Jasper National Park this summer and find that all of them

re quite badly over-exposed. I am told that hey can be reduced chemically. The scenes re so fine that I would like to do anything hat will help me get the prints to look as I emember Jasper. What do you advise?"

ANS.—Making mountain scenes look as ou want them to is a big problem at best nd I would advise you not to reduce the egatives unless they cannot be printed with-ut the treatment. Reduction will increase the rain unless you are very lucky and give egatives that print faster but with poorer uality. Try increasing the printing time on arious grades of paper, being careful of our exposures and giving full development. f that does not work, send me one of the orst negatives. I will try to see if I can do nything with it.

F.J., Atlanta, asks: "When it is necessary or me to use one developer for everything n the darkroom, what solution would you uggest?"

ANS.—It is tough to have to do everything vith one soup, but there are two developers pen to you. Amidol is very flexible in ands that have had some experience with t, but it varies in its effect so much that it s not a good chemical for the beginner. D-72 that may be obtained in cans ready for nixing is probably the best thing for you. Diluted three or four parts of water to one f stock solution, it is good for paper and liluted further it works well for films though t is not a fine-grain developer. I use it on - x 5 negatives occasionally diluted 15:1 vith a developing time of 15 minutes at 65 o 70 degrees.

This and That

The indications are, as this is written, hat there will be no shortage of photographic upplies like paper and film, but that cam-as and other equipment may not be made n real quantity until after the war. Some hemicals—notably the acids and bichromates hat are used widely in defense—will not be vailable, but there should be nothing in he situation to force us to reduce our photo-raphic activity. So there is no need for the anicky feeling that a few photographers nd writers have shown. We may not get verything we want, but when did we? It s a little like the story of the man who asked he doctor who was treating a badly torn nd if he would be able to play champion-hip golf after the wound healed. When the octor said he surely would, he cried, "That's onderful. I never broke 100 before!"

For the above reason there are few new roducts to announce. Burke and James have new view camera, the Grover, on the lines f the Graphic View. It has a long bellows nd back and front that are completely adjust-ble in every direction on a triangular rod. t looks like a fine camera. Speaking of Burke nd James, their Watson Press camera is eing widely bought by New York news-aper men who want a substantial and flexi-le yet inexpensive camera for general work. Write to Burke and James, 223 West Madi-on Street, Chicago, Illinois, for their cata-g. Do not forget to mention NATURE AGAZINE.

Eastman has published several new book-ts that will interest you. The Kodak Data ooks, "Slides" and "Photographic Papers" are priced at 25c, and the "Professional Ko-dachrome" at 35c. Your dealer has them.

Castle Films have announced a number of new 16 and 8 mm films that you will want in your film library. Write for their catalog to Castle Films, 30 Rockefeller Plaza, New York City.

Thanksgiving is a fine opportunity for por-traits—informal or otherwise—of members of the family who do not get around often. Two years ago I spent the day with friends and made shots of a number of them. Now mine are the only pictures of two of them and I am mighty glad to have them. Maybe this year would be the time for you to drag everyone off to the shadow side of the house, line up the camera parallel to the house and make the shots while someone talks to them to get their attention away from you and your black box. Take one or two at a time and make some real shots.

Have you cleaned the darkroom since the summer ended? If not, mop it now. Do not sweep—that spreads the chemical dust around—but wipe everything with a damp rag and mop the floor. A good house-clean-ing is painful at the moment, but it is good business in the long run.

Camera Trails is conducted for the benefit of those NATURE MAGAZINE readers who like pictures and photography. It also main-tains a service to help you solve your photo-graphic problems. Address your questions—your comments and suggestions will be more than welcome—to Norris W. Harkness, NATURE MAGAZINE, 1214 Sixteenth Street, N.W., Washington, D. C.

NEBRASKA MIRAGES

By W. S. SKELTON

Northwestern Nebraska, in the Great Plains region, furnishes grand mirage displays when atmospheric conditions are favorable. When a gray, rather smoky and unnatural-appearing cloud lies along the horizon in the early morning, it is generally mirage material. Such a cloud will usually form into a clear cut mirage before the morning passes.

Pine forests, buttes, and weird castles be-deck a new and higher landscape, which floats majestically above the horizon on such occasions. The mirage ebbs and flows in clarity with changing atmospheric conditions.

One fresh morning last autumn, during the pheasant season, the writer with two com-panions motored about the country. During the ride a smoky, unnatural cloud graced the horizon to the southwest. Occasionally there was a suggestion of a true mirage. Presently, climbing a ridge of hills overlooking the Nio-brara River, the party came in sight of an awe-inspiring spectacle. Off to the southwest a whole new landscape floated fantastically above the horizon. Clumps of pine trees, hills, valleys, and magnificent buttes. For half an hour the phenomenon was clearly visible. In the atmosphere at each end of the display the scenery feathered out into a misty cloud, which in turn extended ever dimmer into the clear sky.

No wonder the legends of old claim that mirages are the handiwork of fairies, and that when we behold one, we are seeing through the veil into fairyland.

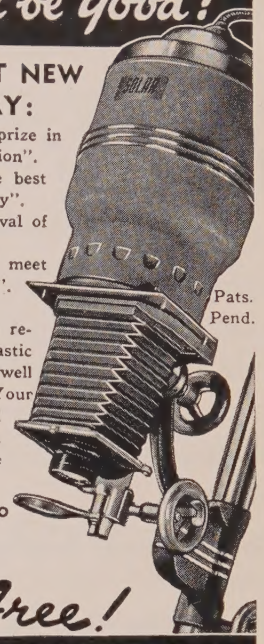
SOLAR ENLARGERS Must be Good!

READ WHAT NEW OWNERS SAY:

" — received first prize in the current exhibition".
" — Solar was the best value for the money".
" — received approval of all club members".
" — I have yet to meet a dissatisfied owner".

Hundreds of such remarks from enthusiastic Solar owners, speak well for Solar quality. Your dealer will be glad to demonstrate a Solar. Literature FREE!

Prices from $39.50



Pats. Pend.

Free!

VALUABLE TREATISE ON ENLARGING
WRITE DEPT. 1041

Mfg by Burke & James, inc.
223 W. MADISON ST., CHICAGO, ILL., U.S.A.

Finest Subway Entrance to all Points of Interest

New York's Popular HOTEL LINCOLN

44TH TO 45TH STS. AT 8TH AVE.

OUR CHOICEST ROOMS From $3

1400 ROOMS each with Bath, Servidor, and Radio.
* Four fine restaurants awarded Grand Prix 1940 Culinary Art Exhibition

MARIA KRAMER PRESIDENT
John L. Horgan Gen. Mgr.
HOTEL EDISON SAME OWNERSHIP

IN THE CENTER OF MID-TOWN NEW YORK

MIRAKEL 6MM. CO DAYLUX BINOCULAR

POCKET PRISM NATURE GLASSES

New and Used Field-glasses, Tel-escopes, Microscopes; all Makes, types and sizes, to fit all pocketbooks. Glasses ex-changed: repair work guar-anteed. Catalogue free.

J. Alden Loring Box K-2 OWEGO, N.Y.

NATURE MAGAZINE

PUBLISHED BY THE AMERICAN NATURE ASSOCIATION
To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

IN THIS ISSUE

Camera Trails . . . . . Norris W. Harkness 478
Nature in Print . . . . . Howard Zahniser 483
November (Poem) . . . . . Paul H. Oehser 484
A Chimp and His World . . . . . G. H. H. Tate 485
Calling All Jays . . . . . H. H. Sheldon 489
Defi (Poem) . . . . . Arthur F. Medlyn 492
The Cassowary . . . . . Edith M. Laing 492
Gray Foxes—All Americans . . . . Vernon Bailey 493
"Skipper" . . . . . Esther Boal 496
Wax from the Wilderness . . . . John R. Whitaker 497
Trained "Seals" from Underground . . . . . E. E. Stanford 500
Lichens—Small, but Important 501–508
As We See It 509
Boto of the Amazon . . . . . Arthur H. Fisher 510
Agate Bridge . . . . . E. E. Stanford 512
Our Endangered Game Birds . . . . . Edward A. Preble 513
Planets Brilliant in November Skies . . . . . Isabel M. Lewis 519
Barren Strawberry—Excellent Ground Cover . . . . . W. C. Wilson 521
Wayfaring Thoughts . . . . . Oscar Ostlund 521
The School Page . . . . . E. Laurence Palmer 522
Under the Microscope . . . . Julian D. Corrington 530

NATURE MAGAZINE, PAST AND PRESENT, IS INDEXED IN THE READER'S GUIDE IN YOUR PUBLIC LIBRARY

U. S. AND CANADA
ONE YEAR $3
FOREIGN . . $.75 EXTRA
TWO YEARS $5
LIFE $100

A. B. McClanahan, Advertising Manager
ADVERTISING OFFICES

New York—295 Madison Avenue
Washington—1214 16th St.
Chicago—203 N. Wabash Avenue
Philadelphia—323-325 Weightman Bldg.
Atlanta—Walton Building
Los Angeles—Western Pacific Building
San Francisco—Mills Building
Minneapolis—233 Radisson Hotel

NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C., U. S. A., and accepted for mailing purposes at the special flat rate of postage provided for in the United States Postal Act of October 3rd, 1917, and February 28th, 1925. Additional entry at Greenwich, Conn. $3.00 a year; foreign $3.75.

Publication and Editorial Office, 1214 16th Street, N.W., Washington, D. C. Additional Office of Publication, Greenwich, Conn.

Copyright, 1941, by American Nature Association. Title Registered U. S. Patent Office. Printed in the United States.

THE ASSOCIATION

ARTHUR NEWTON PACK . . . . . President
Abiquiu, N. M.

RANDOLPH G. PACK . . . . . Vice-President
Darien, Conn.

RICHARD W. WESTWOOD . . . . . Secretary
Washington, D. C.

JAMES A. O'HEARN . . . . . Treasurer
South Orange, N. J.

HARRY E. RADCLIFFE . . . . . Business Manager
Washington, D. C.

DR. E. LAURENCE PALMER . . . . . Director, Nature Education
Cornell University, New York

THE MAGAZINE

ARTHUR NEWTON PACK . . . . . Editor

RICHARD W. WESTWOOD . . . . . Managing Editor

EDWARD A. PREBLE . . . . . Associate Editor

R. BRUCE HORSFALL . . . . . Artist

HARRY E. RADCLIFFE . . . . . Business Manager

SCIENTIFIC CONSULTING BOARD

DR. LELAND O. HOWARD
Retired Chief, U. S. Bureau of Entomology

DR. WALDO L. SCHMITT
Curator of Marine Invertebrates, U. S. National Museum

DR. HARRY C. OBERHOLSER
Cleveland Museum of Natural History

W. L. McATEE
Technical Adviser, U. S. Fish and Wildlife Service

C. W. GILMORE
Curator of Vertebrate Paleontology, U. S. National Museum

VERNON BAILEY
Retired Chief Naturalist, U. S. Biological Survey

DR. PAUL BARTSCH
Curator of Mollusks, U. S. National Museum

DR. EDGAR T. WHERRY
Wild Flower Preservation Society

DR. WILLIAM M. MANN
Director, National Zoological Park

SAVE MONEY ON *Beautiful Christmas Cards*

To help solve your Christmas Card problem, we offer you this outstanding assortment of 20 attractive cards and envelopes—Christmas Cards of simple yet charming beauty, packed in a lovely Christmas box.

AN UNEXCELLED VALUE

These carefully selected designs have a definite appeal to everyone, but are of particular interest to lovers of Nature and the out-of-doors. They include such subjects as snow scenes, rural landscapes, brooks, mountains, lakes, woodland settings, and a few of them incorporate animals in the designs.

The assortment includes many genuine steel engraved etchings, facsimile hand colored in lovely tints and pleasing effects, with deckled edges. Other designs are beautifully embossed.

These cards show dignity and refinement in every detail; from the selection of subjects; the warm and hearty sentiments they express, to the lovely, high quality paper on which they are reproduced.

PRICE
Per Box
(Postage Prepaid)
only **$1.00**

You will be proud to send these Christmas Cards to your friends this year!

AMERICAN NATURE ASSOCIATION
1214 Sixteenth St., N. W.
Washington, D. C.

Send me postpaid ..... boxes of Christmas Greeting Cards, each box consisting of twenty (20) attractive cards and envelopes. I enclose $..... (check or money order) in full payment.

Name.....

Street & No.....

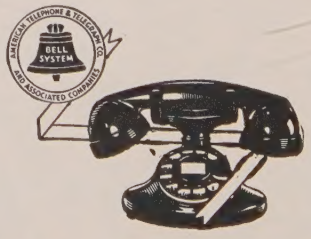
City and State.....

1941 looks at 1916

THINGS have changed a lot in 25 years and yet there is much that is the same.

In 1916 it was Preparedness; in 1941, National Defense. But now the scale is bigger, the pace faster. There was pressure on the telephone business then. The pressure is infinitely greater now. New training camps; new aviation fields; new munitions plants—all need telephones. Every one is moving faster and when a Nation hurries it does it by telephone. The Bell System spent 94 millions on new construction in 1916. It is spending more than 420 millions in 1941.

The entire Bell System organization is giving "first call" to defense. We believe you would want it that way.



BELL TELEPHONE SYSTEM

"THE TELEPHONE HOUR" IS BROADCAST EVERY MONDAY EVENING OVER THE N.B.C. RED NETWORK.

Nature in Print

By HOWARD ZAHNISER

"At dusk of a November day a train slipped out of the ugly yards at Chicago; it was the one they called 'The Rainbow', and there were two people aboard who could really hope to find gold at the end of it."

How many who were not aboard yet were destined to share in that gold can not be predicted, but the train was carrying Donald Culross Peattie and his wife to the signal recognition of *An Almanac for Moderns* that established Mr. Peattie with the American reading public. It was predicted, I recall, that the *Almanac* was a book most likely to become a classic, and it now seems that the prediction and widely publicized prize award that went with it constitute one of the classic incidents of literature.

Until that time Mr. Peattie had been on what appears to have been a faithful but unoriented quest—a man with an inbred bent toward writings, a man with an enthusiasm for and a fleeting professional interest in botany, a man with a determination to understand life and make his way by writing, but at the same time one who had neither found nor had been accepted in a peculiar work. He had served a term as a botanist for the United States Government. He had been an expatriate in Europe, trying there to become a successful novelist. But he had returned to America. And then he began to hear, as he says himself, "the beat of living surely now, the measure of my days as I had lived them, according to my creed and training as a naturalist." He began to write about this, "not caring if it should satisfy any others but myself," and he wrote *An Almanac for Moderns,* the first of a series of books, still appearing, which have amazed and enriched a constantly increasing number of readers.

What an excellent introduction the autobiography of this man, *The Road of a Naturalist,* is to Houghton Mifflin's "Life in America" series! For this autobiographer tells no simple narrative of the chronological events in a man's life but rather infuses the recollections of his own existence into an interpretive description of America. Along the road of this book the reader travels America, sees its scenery, plants, and wild animals, and learns at the same time how the events of one man's life have borne witness to the counsel and inspiration of what he calls Nature. And how subtly and skillfully, with the sureness of an artist, Mr. Peattie has composed the parts of his work into a single saga—a masterpiece of impressionistic writing.

Traveling by train across the continent, thinking of the birds that tell of eastward journeying, even as the changing trees signalize for Mr. Peattie a westward trip, the reader without sense of transition finds himself reliving a short time the author spent as a Chicago newspaper reporter. Deftly an inspiring description of western mountains enters the volume as an interlude in meditations on the loss of a treasured daughter and the mysteries of life and death. And in the description of a night on the Mojave Desert one finds himself arriving with Mr. Peattie at the conclusion that "Nature is an ultimate sanctuary for sanity and goodness; American nature is a first national principle."

Such are some of the aspects of this work, which in a peculiar sense can not be rightly appreciated except in its entirety. Truly it can be said that the entire volume is a sort of hymn to American Nature, a lyric hymn throughout which Mr. Peattie testifies to his devotion to this "first national principle." "To it I am dedicated," he declares and explains that his call seems to be to report and interpret. The events of his life that are set down in this book make this dedication seem inevitable and this self-assignment seem appropriate. *The Road of a Naturalist* itself is adequate demonstration of Mr. Peattie's gift for meeting his own high expectations, an exciting and significant masterpiece for all who are interested in either the outdoors or in documents of human living, with all its strivings, gropings, companionships, bereavements, and assurances.

Standing under oak trees with a manual of botany in his hand, Mr. Peattie at a critical time in his life caught a vision. "Like a firmament," he says, "slowly broke over me the grandeur of a system where every oak puts down its roots eternal and unshakable, yes, and every transient flower. Like stars, I saw, each plant, perhaps each animal, had not only its place but its relation with all others, its measurable distances from them, as if, in evolution's slow tremendous course, all exerted pulls of varying strength upon the others. Species and genus and family, class and subkingdom and kingdom glittered, still dimly, in that infinity. This, with the breath of lilac in my nostrils, the watchman's rattle of a flicker calling after me, was Nature." That vision he is still pursuing and, with the inimitable style of one of our most communicative writers, is sharing with all who will read him.

Within the wide bounds of human living there is no limitation to the implications in the work of such a writer. "We go wondering about immortality," says Mr. Peattie, for example, "unconscious that we ourselves are immortality," that we have our parents in ourselves, "in good measure and for the most practical of all purpose." How apt this thought is in the mind of Donald Culross Peattie is apparent in his own reminiscences of his boyhood home, and it seems all the more appropriate to one who also reads the autobiography of his elder brother, Roderick Peattie, geologist, geographer, writer, and teacher. What a tribute *The Incurable Romantic* and *The Road of a Naturalist* are to the vitality of Robert Burns Peattie and Elia W. Peattie, writers of an earlier generation who still live on in their sons!

Although Roderick Peattie has attained an eminence in his professions as geographer and teacher and has written such books as the following: (Continued on page 529)

Recently published books discussed in this article are:

The Road of a Naturalist. By Donald Culross Peattie. Boston: Houghton Mifflin Company. 1941. 315 pp., with 31 wood engravings by Paul Landacre. $3.

The Incurable Romantic. By Roderick Peattie. New York: The Macmillan Company. 1941. 270 pp., with 19 photographs. $3.

NOVEMBER

By PAUL H. OEHSER

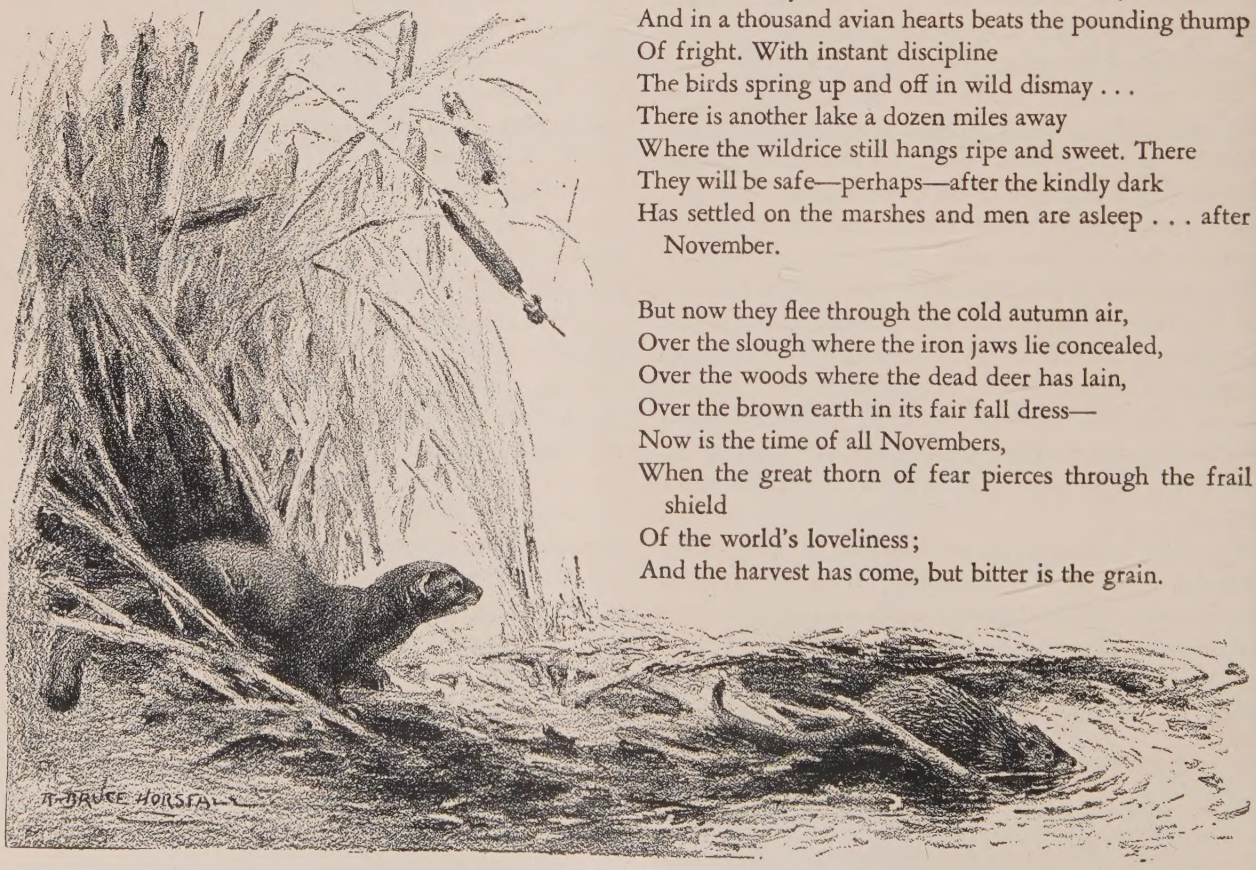
Now when the brown and purple oaks defy the fall,
And the timid elms stand naked, blue, and cold,
And the woods-carpet yields lightly to the scuffling feet—
When the blasted rose droops withered by the garden wall,
The warty toad has found its cleft, the snake has holed,
And no birds sing,
And the night is still, beyond silence—
Now is the time of all Novembers.

In the sheltered clearing the star-eyed doe
Sniffs the frosty air, and remembers;
She smells the pungent thing
Whereby her yearling mate was stricken,
And she is afraid, her cud no longer sweet.
Wildly she starts to run, knowing not where to go,
But away with the wind she runs
To the spot where her fear will thicken
Into red on the trampled grass,
And the hateful smells of man and guns
Torment her final breath.

Now is November—
Now when the wind tears at the cattails in the marsh—
And the old mink and the three-footed muskrat remember,
Their teeth sharp to tear the flesh or gnaw the root,
Their pelts growing prime and thick against the harsh
Cold to come. Suddenly the rat forgets
His enemy the mink, and drops the tender shoot.
He feels on his slick body the man-made ripples and hears
The steely clank of chains
And sees a boat approaching by the shore. Now is November,
And through the swamps and streams and sloughs lie nets
To catch the slender feet, the trembling flesh, implanting fiery fears
In tiny brains.

And the wild ducks remember—the teal,
The mallards, the pintails, the scaups, the canvasbacks—
And the geese, they too remember.
Out of the clear-cold sky they wheel
And as of one mind drop down to rest and feed.
With yaups and honks and gentle quacks
They bob up and down on the shining water. They dive
For the succulent root that makes them plump.
See, over there, a tardy flock of redheads coming in,
A lordly drake flying squarely in the lead—
But now is November,
And there is not room on the earth for all creatures to survive:
The fowler's eye this time has found its mark,
And in a thousand avian hearts beats the pounding thump
Of fright. With instant discipline
The birds spring up and off in wild dismay . . .
There is another lake a dozen miles away
Where the wildrice still hangs ripe and sweet. There
They will be safe—perhaps—after the kindly dark
Has settled on the marshes and men are asleep . . . after November.

But now they flee through the cold autumn air,
Over the slough where the iron jaws lie concealed,
Over the woods where the dead deer has lain,
Over the brown earth in its fair fall dress—
Now is the time of all Novembers,
When the great thorn of fear pierces through the frail shield
Of the world's loveliness;
And the harvest has come, but bitter is the grain.



NATURE MAGAZINE
VOL. 34 · NOVEMBER · 1941 · NO. 9

A Chimp and His World

The story of Wau, which means chimpanzee in Grebo dialect

By G. H. H. TATE

Illustrated by R. Bruce Horsfall

WAU had wandered scarcely a dozen yards from his mother when he saw the crouching leopard. He was a small white-faced chimpanzee, wholly ignorant of the facts of life in the West African forest, yet equipped with that full set of instincts that would guide him through the hourly hazards of his future existence.

Some faint sound had reached his big, rounded ears as the spotted tawny animal settled its hind quarters to spring. Wau's hazel-brown eyes met the blazing yellow ones. The untried instincts worked instantly. He shrieked with fear and leaped for safety.

Wau's screams brought the rest of the band of chimpanzees—excited, noisy, belligerent—to his rescue. All around him cousins and uncles yelled and hooted. They pounded on branches with their feet. They jumped up and down, violently shaking the vines and other foliage. Pandemonium reigned.

The old chief of the troop, his back and sides hoary with age, and two of his strong-arm men, big males covered with black hair, edged downward from their branches toward the disappointed leopard—perhaps with the idea of doing battle. But the creature deemed discretion preferable to valor and slipped snarling away in the undergrowth.

Wau had not lost an instant. Arm over arm, he had flung himself aloft to where his mother crouched on a great limb. There he

"ARM OVER ARM, HE HAD FLUNG HIMSELF ALOFT TO WHERE HIS MOTHER CROUCHED ON A GREAT LIMB."

squatted on one of her feet, wrapped both arms about her leg, and buried his face in the long, coarse hair.

The noise continued for some minutes after the leopard had retired. Then it stopped as suddenly as it had begun. The great gnome-like males rejoined the rest in the trees. Wau dared to look about him. Presently he found himself skipping about among the vines, as carefree as before.

Wau's tribal group of chimpanzees included the old chief, four well grown males, seven females of various ages, some of them caring for little ones of Wau's size, and three or four half-grown youngsters born eighteen months earlier, already able to fend for themselves, generally ignored by and indifferent to their parents. The group varied from time to time in numbers. Small parties or even individuals would sometimes go off alone for days or weeks.

The leopard episode was quickly forgotten. Wau felt hungry. As though the gastric want had come simultaneously to all, the chimpanzees began to descend the trees to search for the edible roots, stems and fallen fruits that occupied much of their daylight hours. Exactly like his elders, Wau came down backwards, with apparent awkwardness although actually with precision and assurance in every motion. He followed his mother and another chimpanzee, perhaps his father, a big-bellied fellow with massive chest, long arms and short, squat legs, who pushed out his long, mobile lips in a point when he "talked" to Wau.

The chief started off through the forest. Wau, following his mother and her escort, saw how they set the backs of their partly-closed fingers to the ground; watched them support themselves on their long arms, swing forward their heavy bodies and partly bent legs, as a man on crutches swings his body and legs between the twin supports. They crossed a soft place in the forest where they left queer-looking tracks; two sets of knuckle marks and the impressions of feet.

Wau felt hungrier now. But happily the chief halted at a thicket of *Calamus* palm, the bitter pith of which was a favorite food, and abundant, for where the thorn-beset, climbing *Calamus* occurs at all it occurs in profusion. It was one of the smaller kinds of *Calamus*—one a little thinner than a garden hose, which could be cut through with a couple of bites by chimpanzees' teeth and the wiry outer bark could be shredded off as easily. The animals ate voraciously; untidily. Wau filled his little stomach and played among the shrubbery. He could hear all about him the m-m of masticating jaws, and sometimes the crash of a branch torn down, or the sharp squeal of a youngster that had gotten in the way of an older animal.

It was the dry season in the Ivory Coast, that annual period of a few months between the rains when long hours of sunshine prevailed, interrupted only seldom by short showers or occasional crashing, cyclonic storms. The ground was hard. The muck soil of palm swamps had become firm enough to walk upon. Huge cotton trees had lost all their leaves. The most experienced chimpanzee could not move about without advertising the fact by the harsh rustle of the withered foliage stirred up by his feet. Such rustling leaves had saved Wau from the leopard. The sodden sound made by the fall of ripe fruit guided Wau and his kin to many a banquet. The atmosphere, vibrant with the shrilling of cicadas, had become misty and smelt faintly of wood-smoke, because of fires set by black men clearing land for their gardens, far away at the edge of the forest.

"THEY CROSSED A SOFT PLACE IN THE FOREST WHERE THEY LEFT QUEER-LOOKING TRACKS; TWO SETS OF KNUCKLE MARKS AND THE IMPRESSIONS OF FEET."

Wau's relatives abandoned the *Calamus* feast in favor of a siesta when the sun had reached its zenith. Several big chimpanzees ascended almost to the roof of the jungle where they luxuriated in sun-baths. Wau and a couple of other young chimps found branches extending horizontally over a sort of highway that passed through the forest. Wau lay on his stomach along the branch, letting his arms and legs dangle limply on either side. He must have dozed.

He was awakened by a warning hoot from his mother, followed by a jerk so violent that he was flung from his perch to a heap of vine-covered debris. An elephant in a playful mood had wrapped its trunk around the base of his branch and shaken it hard. The tunnel-like highway was an elephant-road along which the huge gray animal had come so silently that none of the drowsy chimpanzees had become aware of it. Now it stood, huge ears cocked forward, its trunk swaying lazily, while Wau, who had instantly recovered himself, and the other horrified apes scurried aloft. At length the elephant tore off a trunk-load of twigs and leaves, stuffed them into its mouth and moved on.

In the late afternoon Wau's troop went through the

". . . FOLLOWED BY A JERK SO VIOLENT THAT HE WAS FLUNG FROM HIS PERCH TO A HEAP OF VINE-COVERED DEBRIS."

daily routine of nest-building. They did not know why they built themselves sleeping platforms. They always had done so, as had their remote ancestors before them. Instinct ruled them. They could no more help constructing nests about sundown than Wau could help screaming when he saw the leopard.

An hour before sunset each animal climbed to a leafy branch, or more often chose a thickly-branching small tree and began making the sleeping platform. They broke branches half through, pulled them inward and sat upon them. Exceptionally thick or resistant sticks they bit partly through. Each stick was still attached to the parent stem and to that extent was self-supporting. Rarely were twigs torn completely off the parent branches. This process continued until each chimp had accumulated a mat of branches and green leaves, perhaps six inches thick, beneath his body. When the nest was finished the chimpanzee's weight held everything in place. Two chimpanzees seldom made nests in the same small tree.

Time after time Wau watched his mother form their common bivouac. She worked spasmodically, erratically. Hers was no labor of love, or duty; it appeared scarcely labor at all but rather an instinctive sort of game to be started, interrupted and resumed as her mood changed or her attention wandered.

One evening when Wau squatted at the edge of the partly-finished platform he found his hands arranging little leafy twigs around him, pushing small bits of foliage underneath his body. His queer miniature chimpanzee's thumb refused to oppose like ours. When he used his thumb to pick up a twig he held the twig between his thumb and the outside of his first finger. Not many days later he built a small but perfectly usable nest for himself on a branch a yard or so away from his mother and slept alone.

He was awake an hour before daylight—aroused perhaps by that soft-voiced alarm clock of the woods which the Liberian folk across the river call the "doo-doo bird." As the daylight came pink and pearly over the tree-tops the chimpanzees on their nests awoke like many another forest creature. But they seemed loath to leave their platforms. They sat inert, half awake, listening to the dawn noises of the forest: the stertorous "snoring" sounds made by a band of black monkeys with long, white tails, and the screaming of parrots in the top of a fruit-laden tree. They heard the plaintive mewing of a small bird, the measured whirr—whirr—whirr made by wing-beats of a passing great-hornbill. Wau peered over the edge of his nest, trying to see animals that moved on the ground below.

The sun had been up half an hour before the old chimpanzee descended. The rest of the band followed. The daily hunt for food began. They came to one of those giant trees of untold age—hollow of trunk and flanked by wide-flung buttress roots—which stand scattered sparingly through the forest. The big chief treated his henchmen to a show that Wau had already seen and heard many times. The animal, apparently from sheer exuberance and excess vitality, rushed to the tree and, standing upon his hands, beat a tremendous rolling tattoo on the hollow trunk with the soles of his feet. For the space of perhaps five seconds the great mass boomed and reverberated like a huge drum. And, as the sound, which could be heard for the better part of a mile, came to an end, the group of watching animals screamed and whooped as though in applause. The entire performance had ended in less than half a minute. It was repeated twice more that morning at considerable intervals. And each time Wau felt the

hysteria of the moment surge over him, and screamed aloud with the rest of the gang.

Gradually Wau accumulated personal experience. He had climbed to the crown of an oil-palm and was eating ripe, fat oil-nuts, when his attention was caught by a "ground-hog" below busy nibbling at a large bean. The ground-hog screamed suddenly once and was silent. Wau saw it had been seized by that terror of small animals, a West African python. The great snake's skin, glossy, reticulated, shone silkily in the sun. Wau sat very still until the serpent holding the dead ground-hog had glided from his sight.

He had slipped to the ground one day to seize a newly-fallen fruit—a luscious, peach-like fruit filled with scarlet pulp. As he sat down to eat it something fiery-sharp stung him. Before he could spring up several additional pairs of ants' jaws clamped into his skin. Next second the driver ants swarmed all over him. Uttering wails of anguish, he climbed to a low branch and tried with his clumsy finger and ineffective thumb to pick off the ferocious insects. Fortunately for him their attack was largely wasted upon his coat of black hair. Their instinct was to lock their mandibles in the nearest moving object and grimly hold on.

From his perch a score of feet above the ground he now heard a faintly sibilant scratching noise as scores of thousands of drivers hunted through every cranny and every curled leaf lying on the ground in search of concealed prey. The ants rarely ascended more than a few feet. But near the surface of the soil they attempted to kill and bite into fragments every living thing encountered. Wau saw a big forest-roach dash madly through the milling hordes with a score of ants attached to it, their jaws doubtless cutting relentlessly into the doomed creature's vitals.

Driver ants are one of those factors making up the forest-environment that every living thing must learn to notice. Wau's experience was merely one of the standard lessons included in the West African curriculum.

The unending search for food to which all wild animals are condemned by Nature led Wau into trouble on many another occasion.

The branch-span of one of the oldest of the forest giants encompassed a number of younger trees, seedlings half a century before but now mature. Among the branches of one of them, without knowledge of the potentialities of tons of rotting branches above him, Wau nonchalantly sought clusters of ripe nuts, which he cracked, shelled and ate. Now the giant tree was dead, had been dead for perhaps twenty years. The sodden wood, from which long ago all bark had fallen, sustained a burden of flowering vines and gorgeous-hued air plants. Yet not a leaf amid the mass of greenery was its own. Through the lengthening chain of years, the actions of bacteria, fungi, water, and the burrowing of thousands of fat, white beetle grubs had combined to weaken the entire structure of the tree. Its collapse was imminent.

The end came, heralded only by one sharp crack. The old tree seemed to dissolve as though pressed downward by some giant, invisible force. It did not topple sideways but disintegrated, its massive branches smashing down upon the crowns of the younger growth below.

To Wau, unapprehensively devouring nuts, it seemed as though the entire roof of the forest fell suddenly around him. Two of the well-grown trees beside him were broken off like match-sticks. The branches of one side of his own tree were sheared away. Tough woody vines snapped like so many threads. Why Wau was not dashed to the ground and killed none can tell. He clung to his branch, fearful, uncomprehending, while a faint haze of wood dust that had risen from the ruins of the great tree slowly settled. At last he descended from his position and resumed the endless hunt for food.

Wau had heard and seen man occasionally. Instinctively he kept away from him. But he learned to conduct stealthy raids upon man's cane fields, banana plantations, and cocoa groves. With one or two other chimpanzees he used to slip silently through the underbrush and dense second growth bush that seemed always to margin the plantations. Arrived in a sugar cane patch, each ape quickly cut off a section of cane with his powerful teeth and retired a few yards into concealment where he could enjoy his prize. Wau learned to love sugar cane. He stripped off the hard, outer coating and chewed the fibrous parts until the last drop of delectable juice had been squeezed out. And then he spat out the residue on the ground. Wau's way of eating was just the way any small boy living in the tropics eats sugar cane.

It was during such a foray that his mother disappeared. Wau with several other chimps had sneaked into a cocoa plantation. They were biting open the big fluted, yellow pods and filling themselves with the pulpy seeds. Without warning there came a loud "bang" and Wau's mother fell motionless to the ground while the rest screamed and fled.

Once Wau saw a white man. He was heading for a spot where savory bananas grew—a tiny clearing, planted years before with a few banana plants and then abandoned. Wau's love of cane sap was exceeded only by his taste for bananas. He slipped into the bed of a creek, tributary to a large stream, to cross on the litter of fallen trees that partly choked it. And there stood the white man.

The white man had his back turned to Wau. He wore a big khaki helmet and he was looking out at the river while he transferred to canvas the scene framed by the foliage at the mouth of the creek. The man stooped, picked up something, and put it in his mouth. There came a flash of a match-flame. The man blew a cloud of smoke from his lips.

Wau did not know that the man was painting. He was aware that he had found something new and frightening. And the strain of that novelty was too much for his peace of mind. Leopards and pythons, even black men, he could understand and tolerate. But the sight of a white man under a helmet painting a picture and smoking a pipe was too much for him. Forgetting the bananas, he pushed out his lips, uttered a terrified whoop and fled back to his mates in the deep recesses of the primeval forest where he belonged.

Calling All Jays

Making friends with Oregon, pinyon and crested jays

By H. H. SHELDON

Photographs by the Author

BEAUTIFUL AND FRIENDLY OREGON JAY
When the birds learned that food was available they came fearlessly to feed from the hand, living up to the reputation for tameness credited to them. They are often called whisky-jack, from an Indian name, and camp-robber for their active appetites

FOR enough years to make them a legend, I had heard the Oregon jay, better known as whisky-jack or camp-robber, described as tame to the point of lighting on one's hat, the hat being *in situ*. But even these friendly birds are wise, and, during my years as a field naturalist, the nearest I could get to any of them was gun range.

Research collecting precludes familiarity with the quarry. My camps were danger zones for any rare migrant or native bird needed for comparative study in the form of a labeled specimen. The bang of the collecting gun never permitted me to get a close-up acquaintance with even the camp bird. In all my years afield I had never had one near enough to put salt on its tail until the word went out that I had replaced the gun with the camera.

The personal verification of any natural history fact is a satisfactory experience, and one that invariably carries the flavor of discovery. And the first time a whisky-jack dropped, like a dark snow flake, from a spruce bough to my outstretched hand I was filled with astonishment, and with a sharp sense of loss. It is a curious fact that only then, when I was accepted, could I fully sense the withholding of trust that was the necessary price of my collecting years.

We were camped up in the deep spruce and hemlock forests near the headwaters of the Deschutes River, in Oregon. There the whisky-jacks were common. With no more startling noises in camp than the click of the camera shutter and the ring of an axe, I at last got on speaking terms with *Perisoreus*. When they learned we had food, and that there were no strings to it, J. soon had them not only on her hat but feeding from her hand. When it comes to wildlife, the female of the species belies Kipling's estimate. At least the jays reacted with less fear to the lure of hot cakes when offered by the lady, despite the fact that I had made them. True, I was back of the camera most of the time. And the jays made their own decision as to who was chief hand-outer.

During the previous winter I had learned to whistle the wild and wary pinyon jays down to our cabin door. And I now whistled the come-on note of the camp-bird as near as I could make it, which was probably as musical to the jay's ear as a Chinese flute to an Occidental. But they did learn it meant "come-and-get-it". And they came with whoops like a bunch of hungry cowpunchers. I shot them as I pleased. No need for a blind. No need for a telephoto lens, even if I had had one. I got them at six feet, four feet, and finally two feet—a bird in the hand.

All species of wildlife have their own characteristics. Among each variety are individuals that are less fearful and more daring than their brothers. Time and patience, of which man seems to have increasingly less, will bring any one of them to the camera.

Photographing from a blind has produced many a fine picture. But the portrait thus acquired shows only the animal's reaction to its environment. Getting their confidence for an exposed close-up presents their reaction to men they are just beginning to trust. This budding confidence produces an expression usually not seen in photographs and links the animal or bird sympathetically with the photographer.

Though I have spoken casually of whistling the pinyon jay to our cabin door, the achievement itself was anything but casual. One cannot be long in a forest of pinyons and junipers without hearing the "ha-ha" and cackling notes of a rowdy bunch of pinyons, or seeing them settle like a blue veil to a fresh feeding ground. Yet here is a bird with outstanding wariness toward man and matters domestic, and one with whom I never had hoped to be on terms of intimacy and trust.

Deep snow and cold raw winds make natural feeding

WARY PINYON JAYS, TAMED BY THE STORM, ENJOYED THE FOOD PUT OUT FOR THEM IN THE DEEP SNOW

Later it was possible to whistle these birds down to the cabin door, no mean achievement since these birds are not notably trustful of man. Below, Steller, the crested jay, looks the photographer over carefully

grounds hard to find and have a tendency to humble the most wild and wary. A particularly blustery day with the wind in our favor found us face to face with a flock of pinyon jays that had been blown into the big junipers back of our cabin. J. threw them a pan of mixed scraps in what I felt to be a spirit of unwarranted optimism. Had it been a mild sunny day her movement at that close range would have put them to instant, jeering flight. But the shelter of the cabin trees was good and they sat there fluffed against the wind and only moved their feet in protest. When J. had closed the cabin door, a spirited confab broke out among them. While we watched hopefully from the window, one daring rascal flew down and, with characteristic stride of hop, skip, and jump, grabbed a piece of meat and flew back to a juniper where he held the morsel against a limb with one foot while he tore off bits with his capable beak and gobbled them. This was too much for the flock. *En masse* they came down to the feast.

Next morning, in a drizzle of snow, the flock took up what was apparently a watching position in the cabin trees. This time I walked out and whistled encouragement as I scattered bits of hot cake. They scarcely let me get inside the cabin before they swooped down to feed. During the next few days of fine weather, we did not see them. But with another fall of snow they were back clamoring for a bummers' breakfast. With the help of a few blizzards we got them pretty well tamed. In a month's time, snow or sunshine, they were waking us at daybreak with harsh demands for the hot cake hand-out. If this was slow in coming, they hopped about on the cabin roof, making a concerted noise not unlike a sudden shower of rain. A naturalist familiar with the pinyon jay would have stared dumfounded at sight of this flock coming like chickens to the feeding whistle and hopping about within four feet of camera and photographer.

When the solitaires began to sing and the robins were bathing in little pools of melted snow, we left for higher altitudes to be with birds of a different feather.

So far locality and the elements and no small percentage of luck had brought us on taming terms with two distinct varieties of jays. So, upon getting settled in our cabin on the Little Deschutes River, I decided to attempt the taming of no less a wary and wise rascal than Steller, the

beautiful crested jay. Like the magpie and crow, his relatives, the crested jay has a keen eye for anything in the nature of food. But, although prominent in mountain forests, he is more often heard than seen. To induce a crested jay to eat from the hand seemed to me about the most unpromising endeavor I could select. But, having plenty of time for the experiment, I determined to make a try for it.

Our cabin was located among the pines, just "on the fence" between the Transition and Canadian zones. Bird life was abundant. Nuthatches and chickadees, western and mountain blue birds, Audubon's and yellow warblers, juncos and chipping sparrows, crossbills and russet-backed thrushes, came down to the lures with which we tempted them. Even the rare evening grosbeak deigned to break bread with us. The jays were quick to locate the food, but played their usual game of hide and seek. Perched high in the pines, they sounded their deep and resonant alarm notes and would come down to grab a mouthful and fly screaming away with it only when we were out of sight. It was two months before they dared to help themselves when we were outdoors.

During this time I had learned something of the meaning of their large and varied vocal repertoire. I was surprised to learn that one note in particular, identical to the alarm note of the red-tailed hawk, meant just the reverse in jay lingo: "OK, fellows. The table's set and the way's clear". Fortunately the note was easy to imitate. So, with the hand-outs, went the come-on whistle. In another month they were sitting for close-ups. And, at last, J. had them eating from her hand. Not sitting on the hand to feed as the whisky-jack will do,

WHISKY-JACK HAD BEEN A FRIEND FOR ONLY THREE DAYS, BUT HAD ENOUGH CONFIDENCE IN SAFETY TO COME THUS FOR FOOD

Below, a little tête-à-tête with the crested jay. Although common in mountain forests, this bird is more often heard than seen. Patience and provender proved to be the successful lures that finally brought the Steller jays to feed from the hand

but kicking the hand for a take-off as the beak grabbed food from it. At this writing, with summer nearly gone, a jay in the hand is about as easy to achieve as a Deschutes County mosquito.

I was never sure whether the pinyon jays learned to connect their hand-outs with us rather than with the cabin. But there is no doubt the crested jay recognized his benefactor. Often one or more would follow us long distances through the woods, a pursuing shadow dropping from tree to tree, a demanding and reproaching cry ringing out above us.

Birds have come and gone around us through the season. But the Steller jays are as much a fixture of our camp as the trees in which they lounge about after a full course dinner. They will sit in the shade for an hour at a time, rendering a soft, loquacious medley of notes, presenting a pleasing contrast to their usual boisterousness. When their crops are gorged, they lick the platter clean by burying the surplus. Sometimes, when one fellow got his fill before his kin arrived, he would methodically stuff his bill to capacity, fly away a few yards, scoop out a depression in the ground, drop in the food, and neatly cover it, putting a pine cone on the grave as marker. A late arrival, casting a keen eye from a lofty perch, would steal the cache as soon as the undertaker was occupied with another burial. It occurs to me to wonder how many Christmas trees have sprung into being through the jay's habit of burying the seed.

Familiarity is reputed to breed contempt. But my intimacy with the beautiful crested jay in his Oregon haunts has, on the contrary, gone far toward overcoming a prejudice conceived against the species because of their predacious and cannibalistic habits. After all the jay has his niche in the scheme of Nature. If some of his habits are deplorable, at least they serve to keep Nature alert for the improvement and perfection of the species. So many of the jay's qualities are admirable that making his close acquaintance has seemed to me worthwhile.

•

Defi

By ARTHUR F. MEDLYN

The lordly hawk sails through the sky,
A pinioned peer with watchful eye
Who spreads his wings below the sun
To mock the clouds as one by one
They blow across the April blue
And color him with varied hue.

Their shifting background paints him gray
Or black against his windy way . . .
But winds *may* shift. Though shadows paint
Him clearly black, or gray and faint—
The graceful hawk soars on and on,
Proud, silhouetted paragon!

•

The Cassowary

By EDITH M. LAING

LARGEST of the many strange birds of Borneo are the cassowaries, relatives of the ostrich and emu. Characteristic features are possession of horny casques, and neck wattles. Some six species of these flightless birds of the genus *Casuarius* occur in Australia, Borneo and neighboring islands. They inhabit the forests, and while preferring a fruit, vegetable, and rodent diet, have strong digestions, for, in common with the ostrich, they will eat almost anything.

All are about five feet high, with a black, horny-plated casque on the head. Stout gray legs, capable of high speed, can deliver a bone-breaking kick, and the long, horny, spiked claw of the inner toe can mortally lacerate an enemy. Would-be molesters had better beware, too, of the spine-like quills with which the rudimentary wings are equipped. These black spines are used by the natives to make bracelets.

The "nubbly" wattled neck is devoid of feathers, but brilliantly colored in various combinations, according to species. In a young one I recently saw, two-thirds of its eighteen-inch neck was a vivid tangerine, topped off by bright, glistening turquoise and royal blue, truly a gorgeous contrast to the drab plumage. On the lower part of the neck the birds have one, or, as is shown in the case of the bird pictured on a stamp of North Borneo, two rounded wattles, colored to match the neck.

The plumage, dusty black for males, and dingy brown for females, seems more like coarse hair than feathers. It is used by natives for decorative headdress, and to ornament weapons of war. It has also been used for millinery trimmings.

The cassowary makes a nest of leaves on the ground, laying five to eight eggs, which male and female take turns in covering until they are hatched.

A tree common to the same habitat as the cassowary, and now planted extensively in our warm arid regions, is known as the cassowary tree or casuarina, because its drooping thread-like branchlets resemble the bird's plumage.

THE GRAY FOX COMES TO THE FEEDING LOG FOR HIS DINNER

One of the wild visitors to the animal feeding station maintained by Dr. and Mrs. Spencer R. Atkinson at Altadena, California. This photograph was made by Dr. Atkinson, proprietor of the restaurant

Gray Foxes—All Americans

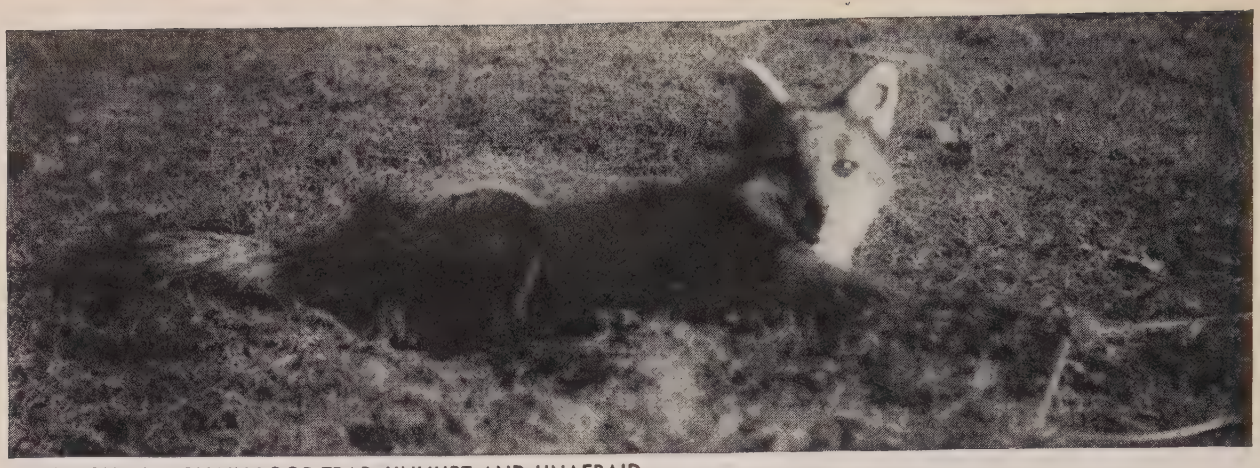
By VERNON BAILEY

"THERE is so much good in the worst of us, and so much bad in the best of us, that it ill becomes any of us to find much fault with the rest of us" applies as well to many of our native animals as to the rest of us. Whether good or bad depends largely on our point of view; just a matter of conflicting interests of the farmers, stockmen, sportsmen, indoor sentimentalists and outdoor naturalists. Often the difference between good and bad hangs in part on our ignorance of certain factors in the lives of the animals concerned—their natures, habits, distribution or abundance.

The gray foxes of the carnivores form a group of purely American animals quite different on one hand from the red, cross, silver-gray or black foxes, and the little kit foxes or swifts on the other, although often found associated with both groups. They are even more different from the blue and white foxes of the Arctic regions with which they have never been in contact. With the same tooth formula as all the other foxes, coyotes, wolves and dogs, the grays have other strongly marked characters of their own—a skull with saggital crest whose divergent branches never coalesce to form a distinct sharp central ridge, as they do in the other Canidae and in most other carnivores; well-curved claws fitted for climbing; a laterally flattened tail, and short coarse hair over the underfur. These and other characters set them apart from the rest of the Canidae as a well-marked genus, *Urocyon*. Freely translated, this word means "flat-tailed dog."

The gray foxes differ also from other foxes in distribution and habits. They are more southern in range, occupying mainly the Tropical and Austral Life Zones, rather than the Boreal and Arctic, and living more in timbered, swampy or rocky situations within their chosen range. They have no great speed because of their relatively short legs, and they could not survive in the wide open spaces. For protection they must depend in part on safe retreats in rocky or brushy cover, or forests where they can quickly scramble up a tree in case of need to escape a larger and swifter enemy.

It is often stated that these foxes can climb a leaning or limby tree. So they can, but they can also go up a straight trunk like a cat, and when shaken from the branches up twenty or fifty feet from the ground they may land right side up, in the midst of a bunch of hounds, and, by quick



GRAY FOX IN A CHAIN-LOOP TRAP, UNHURT AND UNAFRAID

By gentleness and slow approach such a captive animal may be petted and then freed from the loop and carried away. Young foxes make good pets from the start, and adults may also be tamed successfully

dodging, escape them all. This seems to be made possible by the use of the long, flat, rudder-like tail.

Their beautiful expressive eyes are often said to differ from those of other foxes in the rounded pupil. So they do, in dark or subdued light, but in bright sunlight the pupils contract to narrow vertical slits as perfectly adjusted to daylight as are the large, round, open pupils to the dark. They are thus equipped for hunting their food by night or day, as they choose.

Their usual voice is a sharp little bark, like that of a very small dog, but another note is often heard, a prolonged squall, much like that of an old hen caught and held against her will, repeated at intervals of a few seconds. The significance of these sounds is not evident to us, but undoubtedly is to the foxes. In fact, I suspect that the squally call is made by the young foxes before they have graduated from parental care. I have heard it only in autumn or late in summer when the longer screams of the immature great horned owls are often interpreted as the blood-curdling screams of the panther.

Gray foxes breed but once a year, usually in May, having three to six young in a hollow tree or log or among the rocks. These are cared for by both parents. Apparently they pair for life, and at any time of the year, if one is caught in a trap its mate will be found in a trap nearby, or perhaps may be caught in the same trap the next day.

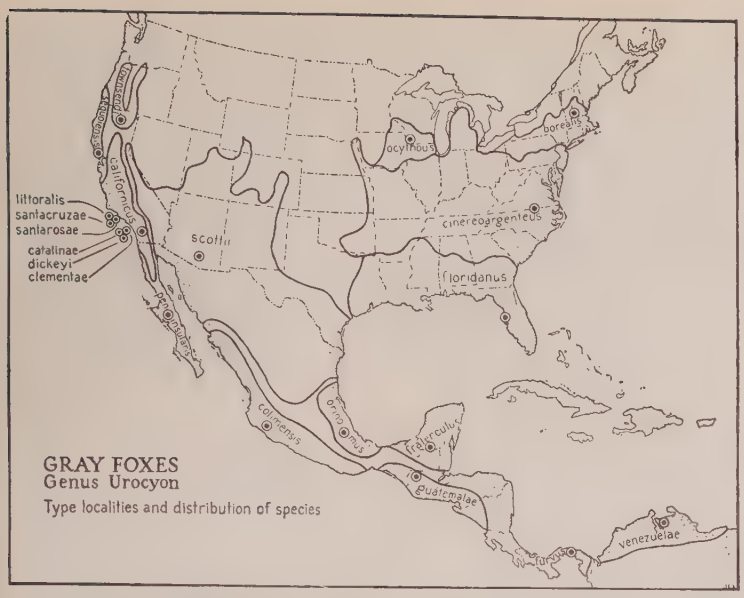
They are beautiful, graceful and intelligent little animals, easily tamed and affectionate. If taken when young and carefully handled they are as gentle as kittens and make delightful pets. Even those captured when full grown soon become quite unafraid if gently handled.

On many occasions I have taken them out of chain-loop traps with my bare hands, and carried them home in my arms without their making a struggle to escape or trying to bite me. Quite recently I caught an old female near Lyons Falls, New York, and by approaching slowly and talking to her soothingly soon came near enough to stroke her tail, then her back and on up to her neck. Then, with left hand held loosely around her neck, I loosed the flexible chain from around her ankle, gathered her up in my arms and carried her a quarter of a mile to the house. After showing her to all of the family and getting some good close-up snapshots, I slipped her into a clean and well-ventilated gunnysack, tied it securely and left her in a dark place in the house for the rest of the day and night. She did not struggle or resist but was too much frightened and worried to eat much of the food I put in the sack for her that night.

I noticed at once that she was a female, with the pinkish tinge to the fur of the belly characteristic of foxes that are nursing young, and on the following night one of her full grown young was caught in the same trap. He was even more gentle and almost welcomed me as I approached slowly, talking reassuringly to him. He did not make a struggle as I knelt beside him and began stroking his tail and then his back and sides farther and farther up, until my fingers were slipped loosely about his neck, while with my right hand I hooked the trap springs together and loosened the chain around his ankle. Then gathering him up in my arms, I carried him home without even holding my fingers around his neck. Now and then he would look up in my face with wondering eyes, but he never made an effort to escape. After the family had admired him and stroked his pretty red and gray coat, he was put in the same sack with his mother where he cuddled as close to her as he could and was kept for another night.

I wanted to take him home for a pet but could not bear to separate him from his parents, both of which I had caught and carried in my arms, so the next morning mother and son were taken out in the big meadow and photographed in our arms, then released and followed with moving pictures as long as they were in sight, running swiftly for the edge of the timber.

For a couple of weeks I had been watching their tracks along the roads and trails, and examining their droppings to learn something of their food habits. I found that the older signs made in August showed mostly seeds of raspberries and blackberries, grasshoppers, meadow mouse fur and bones, one jumping mouse, and feathers of a robin, and in the September pellets great numbers of the seeds and skins of chokecherries. Of the food I offered them, chicken bones, chop bones and any meat scraps, bacon-grease sandwiches, baked beans, tallow, ripe fruit, green corn on the cob, and most of the table scraps, all were



MAP SHOWING THE DISTRIBUTION OF THE SEVERAL SPECIES OF GRAY FOXES IN THE UNITED STATES AND CENTRAL AMERICA

eaten. In the previous autumn they were feeding also on the abundant ripe and very tasty thorn-apples, but their fall diet was made up largely of blackberries and chokecherries, which were then especially abundant. They had been seen catching woodchucks in the fields, and I saw places where they had chased but failed to catch cottontail rabbits. One morning in a sandy bank not far from the creek I found where a nest of snapping turtle eggs had been dug up and eaten and the place left well trampled with gray fox tracks.

A flock of a hundred hens and chickens had caught grasshoppers all summer in the grassy field where these foxes ranged, but were carefully shut in at night, and none were missing. On the whole this fox family appeared to be practically harmless, and even of some benefit to the farm. Meadow mice and woodchucks were scarce and the destruction of a dozen snapping turtle eggs might be worth a brood of ducks to any farmer.

With a wide and varied range, these foxes naturally differ widely in food habits in different places. They are about as omnivorous as bears or dogs, and seem to like anything that is good food. In the Eastern states their summer menu of mice, rats and other rodents, grasshoppers, crickets, beetles, crawfish, turtle eggs, snakes and lizards, berries, grapes, chokecherries, persimmons and a long list of other fruits, acorns and nuts, with occasionally a chicken or grouse or set of eggs, is so largely of a harmless or beneficial nature that except for a slight amount of small game eaten the foxes may be considered the farmer's friends. The occasional poultry taken counts for little against them, as domestic fowls could easily be shut up at night, and safeguarded from danger.

In west Texas, New Mexico and Arizona the foxes feed on the great variety of rodents, rabbits, and insect life, a few birds and eggs, much fruit of the cactus, juniper berries, acorns, nuts, and possibly some young game animals.

In California and Oregon they feed largely on rodents, but eat much waste fruit, especially berries, grapes, peaches, apricots, prunes, cherries, figs and tomatoes, mostly left on the ground. Their check on over-abundance of ground squirrels, gophers and mice is of enough value to counteract any slight losses of poultry, and to the farmer they are highly useful animals. To the sportsman they are an enemy of some of the small game—quail, grouse, pheasants—that he wants. To the trappers they are of some slight value for fur.

The term *carrion* used by professional biologists in listing the food contents of fox stomachs is misleading, as it simply means dead animals that the foxes are feeding on, usually fresh wholesome meat of animals killed or thrown out when dead. The foxes are dainty feeders and there is no evidence that they eat decayed or putrid meat. Such meat is worthless for trap bait, except when it has developed an offensive odor, which has a strange attraction for all of the Canidae, not as food but as perfumery.

Gray foxes are more abundant and widely distributed than is generally realized. In Pennsylvania, for the protection of game birds and rabbits, bounties have been paid on about 9000 of these foxes each year from 1915 to 1931, and in 1939 about 10,000 were presented for bounties. Still they are abundant in Pennsylvania, as well as in most of the other states in their range, except where poison has been extensively used.

Their fur value is less than that of red foxes, so they are less in demand by the fur-trade, and seem to be holding their numbers to a fair abundance. A greater or unchecked abundance might mean the destruction of much small game—rabbits, squirrels, quail and grouse. There seems to be a happy medium in abundance of all animals, especially carnivores and rodents, and these foxes seem to be filling their proper function over much of their original range. The real interest in their lives, however, is missed by most people through lack of more intimate acquaintance with them. With all the intelligence, affection and virtues of the best of our dogs, they still lack the common vices of domestication and civilization. I like them and like to win their confidence and then let them go free.

Differences and Distribution of the Gray Foxes

Eastern Gray Fox. Urocyon cinereoargenteus cinereoargenteus (Schreber), 1775.

Type locality, eastern United States.

Size medium; color dark gray with bright rusty brown on neck, breast sides and belly; black on nose, chin, crest and tip of tail; white on throat and back part of belly. Measurements, adult male: Total length, 1005; tail, 372; hind foot, 135 millimeters. Weight about 10 pounds. Range, middle eastern states in Upper Austral Zone.

Northeastern Gray Fox. Urocyon c. borealis Merriam, 1903.

(Continued on page 528)

"Skipper"

By ESTHER BOAL

In July a baby cedar waxwing was rescued from a dog's mouth. Many foods were tried, but bread and milk were his daily food until October when a vacation made it necessary to find a new home for him. The Nature teacher at Emerson School, Gary, Indiana, gladly accepted the fuzzy little orphan.

Seeds mixed with dried insects and fruit, pablum, grit, powdered egg, and milk were mixed together. He accepted this new food gladly. He was named Skipper. On October 21, a bunch of wild grapes was tied in his cage. He cocked his head and jerked at a grape, struggling to get it down. From then on grapes became his mainstay.

On October 22, he had his first pictures taken. A week later mealworms were offered him. He ate six worms right down, almost jerking them out of proffering fingers. By this time new feathers were replacing the nestling plumage and down, tiny yellow tips showed where the new tail would be. He was so contented and happy that he warbled softly all day long. By early November, one of his tail feathers was an inch long. He now ate apple slices and lettuce. His crest was almost full grown and he began to look sleek. He liked to drink water from fingertips.

Then came a deep snow storm. Skipper's grape supply was gone, but two bright-eyed boys said they knew they could find some if excused from class for half an hour. They came back with a pan full of wild grapes from the side of a sand dune.

By November 14, Skipper had five long, yellow-tipped tail feathers and the red spots of wax showed on his wings. Bunches of bright red Jack-in-the-Pulpit seeds were added to his diet, in addition to wild grapes from the dune.

Finally deep snows and freezing weather put an end to his grape supply. Here "Buddy Waxwing," whose story was told in the December, 1939, NATURE MAGAZINE, came to our rescue. We were thankful that Gertrude V. Grover told what she had fed Buddy because Skipper gladly accepted tan raisins, honey, and ant pupa cases mixed with his pablum.

On December 3, our bird had his picture taken on a snow-covered branch of yellow pine to be used as a Christmas card. He ate pieces of green grapes, tan raisins, staghorn sumac berries, and honey.

On December 4, Skipper took his first all-over bath, and also drank some orange juice. We added iron to his drinking water December 10. He liked from three to five mealworms daily, but when we tried to substitute hard boiled egg for his powdered egg he refused it. He takes what he dislikes in his bill and throws it to the bottom of his cage.

SKIPPER POSES ON NATURE MAGAZINE

Below him is the picture of another orphaned waxwing described in the December, 1939, magazine

On December 16, the biology teacher sent him two bunches of wild grapes from Michigan for his Christmas present. They were dry and hard, so he pulled them off, one by one, and threw them down. On December 20 he had his first ice cream.

Skipper spends his week ends and vacations in a private home, where he has exactly the same food as at school, and a cage exactly like his school cage. He has a traveling cage that slips inside of a padded cover lined with seven layers of paper. After the two-week Christmas vacation, he seemed to have forgotten us and seemed afraid of the large groups of children. But within an hour he was drinking from our fingertips, warbling softly and skipping about. He has a tiny bell that he loves to strike with his bill.

On January 9, he drank tomato juice and ate part of a fig. By then he was in full male plumage, glossy and sleek, active, friendly, interested in everything, had a beautiful crest, and, as one boy said, "Isn't he a real gentleman?"

SKIPPER'S CARRYING CASE

In this specially prepared cage he travels from school to a private home over weekends and during the vacation periods. His diet is always kept the same and he has a school cage and a weekend cage that are exactly alike so that he will feel at home. After Christmas vacation away from school the children seemed to frighten him, but within an hour he was back in school life once more

WAX FROM THE WILDERNESS

By JOHN R. WHITAKER

Photographs by Joe W. Langford

CANDELILLA GROWING ON A LIMESTONE MOUNTAINSIDE IN WEST TEXAS

It is a slow-growing perennial that neither heat nor cold appears to bother. Note sun glasses in the lower left corner that give an idea of the comparative size

THE polished floor of your living room—the gleaming wings of warplanes.

The soles of your shoes—the tents and tarpaulins of an Army division.

The records for your phonograph—the powder charge for a sixteen-inch gun.

What, you may ask, have such diverse articles of peace and war in common? The answer is a strange product of the wilderness—a wax for which there is now a rapidly increasing demand, and which is produced in this country only in that mountain-filled pocket of Texas created by the Rio Grande and called the Big Bend. The odd-looking plant that furnishes this wax is known as Candelilla (con-day-LEE-ya), a Spanish term meaning "little candle". And it is this "little candle" that may light the way to the development of a new industry in the Southwest.

The sight of clouds of smoke and steam rising from the gray and arid foothills of the ghostly Chisos Mountains was the unusual spectacle that I encountered one winter day when I drove into the tiny settlement of Glenn Springs in Brewster County, Texas, once the scene of an engagement between United States Army troops and a band of Mexican irregulars during the 1916 border trouble. Then, the smoke had risen from houses fired by the bandits; now it was rolling up in bluish billows from a row of pits. Nearby sprawled hummocks of gray-green weed to which high-piled trucks were adding their burdens. A score of men—Americans and Mexicans—busy with pitchforks, ladles and skimmers, were tending fires and boiling vats. I had stumbled upon a rare and little-known industrial unit—a portable Candelilla wax factory.

As a result of chance introduction that day, I have learned a number of interesting things about Candelilla. I have discovered that Mexico is the real land of Candelilla and there it was first put to use long ago, so long ago no one seems to know when. However, the earliest inhabitants of West Texas, the basket-makers, appear not to have used the plant. At least it has not been found among the bundles of herbs in their prehistoric caves.

Candelilla's slightly alarming scientific name, *Euphorbia antisyphilitica,* is derived from the use of its acid, milky juice as a remedy for syphilis. In Mexico the wax is used to finish tanning certain leathers, and native artists employ it in making artificial flowers and figurines. The little fiber matches so popular in that country are coated with it, and at one time it was mixed with chicle to make chewing gum.

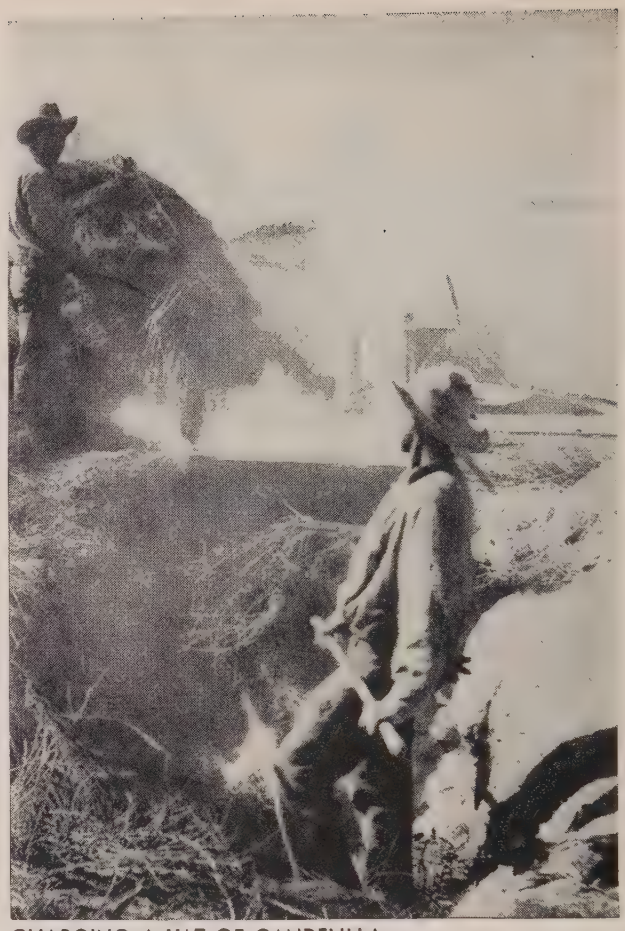
It was probably from the Mexicans that the early-day Texans learned how to extract the wax and to substitute it for beeswax in their candles, and to brew a kidney medicine from the fresh plants. These same hardy, fun-loving people also waxed their floors in preparation for a *baile* or dance.

It was not until the beginning of the present century, however, that the vast acreage of Candelilla in the Mexican tableland, particularly in the states of Coahuila, Chihuahua,

Nuevo Leon, Durango and Zacatecas, became an important source of national income. Discovery of the excellent hardening and waterproofing qualities of the wax resulted in wide demand, especially in the United States and Germany, and large-scale production began in Mexico. Today Mexico supplies the world with Candelilla wax, and in certain years the United States has bought the entire output. In 1935 the Mexican government, alarmed at the drop in price to five cents a pound, which was caused by oversupply, took control of the industry. In 1937 an export tax was put on the wax and this, together with the increased needs caused by the present conflict in Europe, is bringing the price steadily upward. Enormous quantities are being purchased by our government in its rearmament program, and the price has risen sharply. Thus it is a matter of economy that serious attention be given to increasing production in this country.

Candelilla grows abundantly in limestone soil on the brows of hills and on southerly mountain slopes of the Big Bend. Unarmed and unarmored, it appears somewhat out of place among the barbed and thorny inhabitants of this semi-arid highland. It possesses neither the size of the Spanish dagger, the formidable saw-teeth of the sotol, nor the vicious spines of the chollo. In form, flower, and fruit, Nature's economy has reduced it almost to the barest essentials. Like a tuft of very coarse leafless grass, its dozens of pale, ashy-green shoots, smaller than pencils, spring unbranched from an underground tuberous root to a height of from three to five feet. Grass-like, too, are nodes found at intervals along the nearly smooth stems. Here may be seen vestiges of leaves, and, in May and June, there are infinitesimal rosy flowers that give way to three-celled, poinsettia-like seed pods holding minute seed. Like many other desert perennials, the wax plant grows slowly, sometimes as little as an inch a year, and from three to five years are required to bring the plant to maturity. Virtually unknown to Americans, although its product is ingredient in dozens of household articles, Candelilla probably has more uses than any other uncultivated plant on this continent.

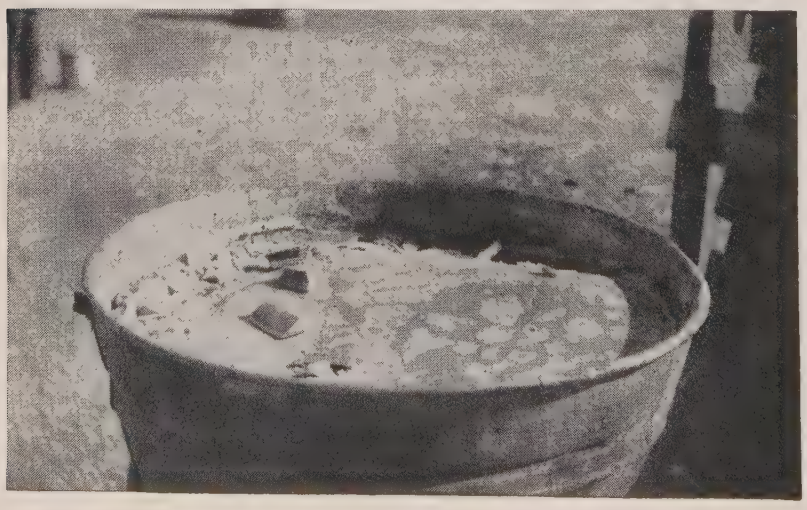
Growing among moisture-holding boulders at the feet of its more showy neighbors, and shunned even by grazing animals, the plant ingratiates itself to man because of its coat of white powder. Like fur on an animal, this sheath thickens in winter and thins in summer. It is almost pure wax. Its ordained purpose is to protect the plant against cold and evaporation of moisture, thus enabling it to thrive on the dry and ofttimes frigid hills of west Texas and Mexico. Not only is the wax deposit heavier during cold weather and drought, but also winter wax has a higher melting point and greater density—factors of cardinal importance to the industry.



CHARGING A VAT OF CANDELILLA

The man at the left is putting in fresh plants while the other feeds de-waxed pulp to the fire

Like trappers, the gatherers of wax plants, or pullers, scour the hills in winter, and the factories operate at capacity. Only those plants bearing a heavy coating of wax are gathered, and experienced pullers recognize these by the color of the shoots. A simple test is to examine the smear of white powder made by twisting a stem over the forefinger. Armloads of the plant, called *yerba* by the workers, are carried to burros or trucks which take them to the factory. Pullers



A TUB OF WAX

This is the product finished so far as the preparation in the field is concerned. It is now ready for breaking and shipment and is Candelilla wax

FIRING UP A REFINING TANK

The crude wax boils for two hours, cools over night and is then known as *cerote*. Chisos Mountains in the background

READY FOR FINAL PROCESSING

This is a cooling pan of hardened crude wax. Preparing the wax calls for a knowledge of the process lest it be spoiled

know that plants growing high on slopes will show more wax than those found in lower places where less protection is needed against cold. And it is true, also, that the luxuriant growths following a season of abundant rainfall will yield less wax than those plants denied so much moisture. This peculiarity, which has prompted experiment with irrigation, has two causes. When there is plenty of moisture there is no need for the plant to insulate itself against evaporation; also, it has been found that heavy rains wash off much of the wax that has formed. It is hoped that experiments with irrigation, now going on, will prove in time that there can be increased growth without lessened wax deposit.

The wax factory, a mobile unit consisting principally of vats and tubs and other simple equipment, is set up at the nearest well or spring. Vats are metal tanks buried flush with the ground surface over hot fires. When the water in them is boiling, Candelilla is forked in from the huge piles made by the puller. A metal grating, or *parilla,* is lowered into the vat to keep the mass of *yerba* well below the surface, on which the melted wax gathers in the form of a dark foam. After ten minutes of rapid boiling, sulphuric acid is added to coagulate the wax.

Now the wax is ready to be recovered. It is skimmed off with a spoon-shaped strainer, or *espumador,* and poured into an iron drum which has an opening near the bottom to allow drainage of excess water. When wax stops gathering on the surface of the vats, the exhausted weed is removed, dried, and used as fuel. At the end of the day the raw wax is collected in a large tank, boiled for two hours, and left to cool over night in pans. In cooling it separates from the remaining water and hardens. It is now a dirty gray and is called *cerote,* crude wax.

Eight hours of careful boiling and a second charge of sulphuric acid are required to refine *cerote.* The acid is used to separate remaining foreign materials and to dehydrate the wax to commercial specifications. This is the critical stage in the extraction process since an entire tankful, representing a day's output, may be ruined by under- or over-cooking.

When the operator sees that the contents have reached the proper color and acidity, the hot wax is poured into cooling vats and allowed to harden. When cool, it is broken into small fragments, packed in jute bags and is ready for shipment to market. Now the color of homemade soap, with further refining it becomes white and somewhat transparent.

Since the percentage of wax in Candelilla is small, ranging from one to six per cent, the amount of *yerba* that must be harvested and treated is large. At the "factory" pictured fifty tons of weed and 550 pounds of sulphuric acid are used to produce a ton of wax, the average output of a single vat being between forty and sixty pounds a day. Under the best conditions the somewhat crude methods of extraction yield not more than half the wax content of the plant. Most of this unrecovered wax is

in the cells that constitute the cortex of the shoots.

Harvesting must be controlled rigorously to avoid depletion. In Mexico the plants may not be gathered more often than once in three years in a given territory, and then they must be pulled off at the ground in such a way as to leave the main roots. Harvesting by cutting the shoots —which bleeds the remaining roots to death—is forbidden by the government. Specialists at Texas Agricultural and Mechanical College have cautioned against over-exploitation of the Big Bend acreage. They point out that, despite the estimate of a million acres of the plant in that area, uncontrolled gathering would be disastrous since a period of ten years may be required to regain a stand that has been over-cropped. Experiments are now in progress in the United States to determine whether the plant's growth can be accelerated and the wax content increased through irrigation. Mexico likewise is experimenting with the cultivation and propagation of the plant, particularly with a view to raising the melting point and eliminating the resin content. Only in these two respects is Candelilla wax inferior to its competitor, the Carnauba wax of Brazil, which is three times as costly.

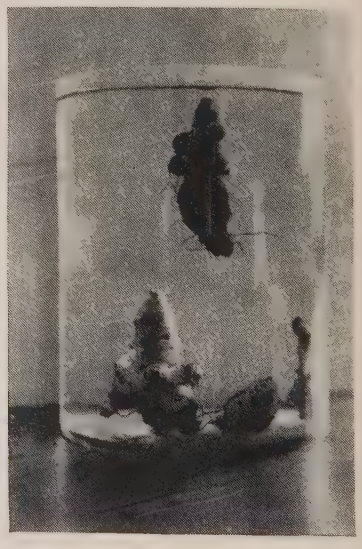
Candelilla wax lends itself to many industrial uses chiefly because of its value as a hardener. It goes into the making of phonograph records, celluloids, sealing waxes and dental molding compounds. Fine high-luster varnishes and lacquers for metals require it. Mixed with other waxes and resins it is found in saddle, shoe, floor and furniture polishes. Together with gum elastic and gutta-percha, it is used in making electrical equipment and insulators. Now that the supply of the more expensive beeswax from Spain has diminished, the New World product finds hearty welcome in the shoe industry. Leather soles are treated with a solvent containing it to prevent squeaking, while stitching threads are coated with it to increase their strength.

Candelilla wax has important military uses. It is employed in waterproofing Army tents, tarpaulins and ducking, and in lubricating the heavy thread with which such materials are sewed. The wings and fusilages of airplanes are treated with it to prevent deterioration and to reduce friction. It coats and moisture-proofs the cylindrical linen bags that hold the powder charges for Army and Navy long-range guns.

Manufacturers of paper and fabrics consume considerable quantities. Special papers for printing are surfaced with preparations containing Candelilla wax, which also goes into the making of parchment, transparent and carbon papers, and paper stencils. Sizes for textile fabrics contain it, while at weaving mills the wooden or metal shuttles on the looms are waxed to lessen friction. It goes into the manufacture of pencils as a lubricant in the "lead".

The attention of the Federal Government has been directed to the Big Bend of Texas as a site for a great international park in order to preserve for posterity a vast and fascinating wilderness of mountains and deserts. But soon, among the tourists who are coming to the Big Bend in increasing numbers, may arrive business men and chemists whose eyes are directed not upon the picturesque beauties of that strange land but upon the lowliest of its vegetable denizens—the little gray candles.

•



Trained "Seals" from Underground

By E. E. STANFORD

Photographs by the Author

FEW MATERIALS are just as heavy as water. Cellulose, starch, and most other plant components are somewhat heavier than water, and if a plant part floats, it is because there is considerable air in it. Nearly all kinds of wood floats when dry, and all kinds—even balsa—sink when fully saturated. Onions and apples swim—barely—and potatoes go down. When these amphibious looking tubers of the Jerusalem artichoke were put into water for washing, they proved to be almost perfect examples of what the physicist calls "Sp. g. 1." In this battery jar of water, they stayed at the top if care was taken not wholly to wet them. Once sunken and thoroughly drenched, they danced daintily about the bottom, or rose slowly to touch the surface film, then descended again to oscillate below.

Here are three different lichens belonging to the large genus known as *Cladonia*. The taller specimen in the center is the reindeer moss, C. *rangiferina*, or a form closely related. At the left is C. *cristatella*, a red-fruited lichen, or a form close to it. C. *chlorophaea* stands at the right. Most lichens have not received popular names. Those shown here are slightly larger than natural size. Photograph by Alston.

Lichens—Small, but Important

Photographs by Devereux Butcher, Charles E. Mohr, and C. C. Alston

As a class the lichens are world-wide. They are fewest in species in the tropics, and most numerous in Alpine and circumpolar lands. With the algae and fungi they are pioneers in the plant world, preparing the way for the higher groups. They thus serve all Nature, making soil by breaking down the rocks, binding together the new soil, and enriching it with their own decay.

In cold regions lichens grow closely to rocks and the ground. In the warmer climates they are more often to be found on wood.

Lichens of several species provide food for wildlife and man. Of these the most important is the so-called reindeer moss, widespread in the North where the reindeer and caribou feed upon it. The manna of the Israelites may have been a lichen torn off and carried by the wind. In arid north Africa and western Asia a common lichen provides flour for the bread of the Tartars. Perhaps this is the plant referred to in the Bible. The *tripe de roche* of Arctic lands helps in starvation times.

Formerly lichens provided dyes, but new discoveries have supplanted this use. Certain lichens contribute in a limited way to medicines.

There are some 250 genera and about 4000 species of lichens, forming a large and complicated group whose members vary in interesting ways in formation, color, size and habit. The lichen plant is really a combination of an alga and fungus living together. They grow slowly and attain great age, but are, nevertheless, delicate structures.

The fungus part of most lichens sends off spores, but most species are produced by soredia, each of which is a bit of alga wrapped in a weft of the fungus. Collectively they appear as a fine powder. Also, with some forms, the wind distributes bits of the plants, or they are carried by animals, and these grow into new lichens.

As will be seen in the pictures on these pages, lichens take different forms. Some grow as a sort of crust on a surface; others have leaf-like formations; some have a shrubby character. There are many colors among the lichens, principally purplish-black, brown, yellow, orange, greenish-gray and white. Light, moisture and habitat bear importantly on color variations.

The pictures here can provide only a small glance at the whole fascinating and really important subject of lichens. More than usual space has been given to them in hope that they will win new friends and students.

In the three pictures above we see much enlarged views of two lichens of the genus *Cladonia*, photographed by Mohr. The first two are C. *cristatella* of two forms, photographed in Canaan Swamp, West Virginia. These are common lichens notable for their red tips. The right-hand lichen is *Cladonia coniocraea*, photographed in Berks County, Pennsylvania. Besides a variety of species in the same genus, there are varied subspecies and forms of many of the species. Below is a photograph of the *dilatata* form of C. *gracilis* growing among other lichens in a dark, evergreen woods. They are here about two and one-half times natural size. Photographs by Butcher.

On this page we see a graphic indication of variety among the lichens. Above is *C. verticillata*, which grows along banks, in old fields and along the edges of woods. It is widely distributed but usually in small colonies. Below is *C. subcariosa*, which grows in soil, both in the East and West. At the right, reading from the top, is reindeer moss, *C. rangiferina;* then *C. coniocraea*, which grows in earth, decaying wood, and at the bases of trees throughout the United States; then the *carpophora* form of *C. chlorophaea;* and, finally, a simpler form of *C. chlorophaea* that is found all over the United States growing in rotting wood. Photographs by Mohr, taken in West Virginia and Pennsylvania.

Most of us have seen rotting logs with lichen growths such as we see in the Alston photograph from Littleton, N. C. This is *Cladonia bacillaris*. Thus does Nature provide for the hastening of the process of decay, and for the return to the soil of the organic matter in the tree trunk, to provide for enrichment of the forest. This is a graphic example of the part that lichens play in Nature's scheme, a part that invites further study of this large and interesting family of small but important plants.

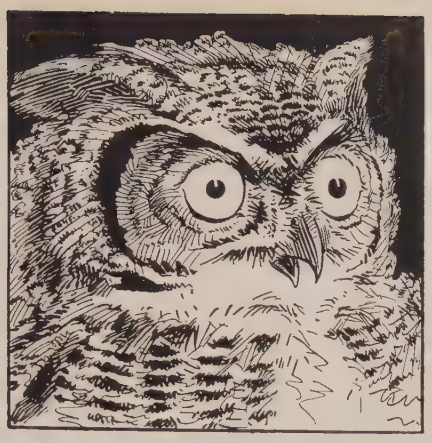
At the right is a detail of the same lichen species growing on the log above. This is enlarged about six times. The spikes of the lichen are red, and the base color of the plant is gray-green. Below, slightly enlarged, is *Cladonia alpestris*, one of the so-called reindeer lichens. It was photographed by Butcher, who found it near other small plants, on a rock-ledge open to the sun. This is the typical habitat of this interesting and attractive lichen.

Above is the interesting *chordalis* form of *Cladonia gracilis* found growing in dark spruce and pine woods in Maine about two hundred yards from the ocean. Mingled among the lichens are plants of one of the haircap mosses. Photograph, about one-half larger than natural size, by Butcher. At the right is a photograph by Alston of a *Cladonia* of the *C. sylvatica* group; below is a close-up view of the brown fruiting parts of *C. mitrula*.

With the picture above, by Devereux Butcher, we move from *Cladonia* to another genus, this being *Peltigera apthosa*, a common lichen to the eyes of any wanderer in the woods. It was photographed in Maine growing on damp ground and among mosses in a shady spruce forest. It is shown here about one-half larger than its natural size.

Variety in lichens. Above, left, is *Lobaria amplissima* growing on an ash tree in a heavily forested valley and, right, is *Usnea barbata*, or old man's beard, which was growing from a spruce twig on an island off the Maine coast. Below is *Parmelia vittata*, found on a dead twig of the lower branch of a spruce. Those above are about half natural size, and the one below almost twice natural size. Photographs by Butcher, all made in the State of Maine.

Like a small, mound-like island is *Stereocaulon paschale*. This lichen may be found isolated on a bare slab of rock or may be found near other small plants, perhaps other lichens, growing in shallow soil. This specimen had chosen a rocky home in Maine. Below is a familiar lichen bearing the scientific name of *Umbilicaria delenii*. It is here photographed growing on the side of a giant boulder in a damp, dark forest of birch, beech and various conifers. Photographs by Butcher.

As We  See It

NATIONAL FOREST ★★ WILDLIFE

About two million, one hundred thousand animals now make up the big game population of the National Forests, according to estimates based on censuses for the beginning of the year 1941. This population represents an increase from about 693,000 animals in 1924, and it is estimated that the number of big game animals has doubled each decade since 1908. In connection with these figures it is further interesting to note that it is believed that one third of all the larger mammals classed as game are to be found within National Forest boundaries, and that, for the western states, three fourths of the big game make their home for all or part of the year in these areas.

Thus the National Forests, and the wildlife policies with respect to them, are of vital importance to all Americans, whether they are interested in these animals as a part of the American scene or as targets. Generally speaking the United States Forest Service policy is one based upon collaboration with the game officials of the states in which the forests are located. At the same time, the Service is faced with the problem of maintaining a game population of adequate numbers, yet not more than the range will stand. It is confronted also with the fact that more than 700,000 big game hunters, more than 300,000 small game hunters, 12,000 trappers and some 2,600,000 fishermen used National Forest wildlife resources last year. This does not take into account the uncounted thousands, bearing no arms and carrying no ammunition, who took advantage of the expanding recreational facilities of the National Forests, enjoyed the wildlife and left it there.

In view of these factors, the estimate of the Service that the fish and wildlife resources of the National Forests represent an asset of a hundred million dollars does not seem to be an exaggeration. At the same time, it emphasizes the vital necessity of implementing the Forest Service in every needful way—in facilities for research, law enforcement and administration—to the end that the National Forests may continue to support such an important wild population.

Foresters find as fundamental a policy of sustained yield, the professional term for so administering forests that they may continue to yield timber year after year. The same principle should be applied to the big game, fur-bearer and small game population. These great reservoirs of timber supply also may be the source of fur-bearers and other wildlife if, in the light of accurate scientific knowledge, "crops" are allowed to reach proper proportions and are harvested with discretion.

Of the seemingly great population of big game animals, deer constitute eighty-six per cent, while other species may be too few. Study of the possibilities of the range and of bringing about a better balance between different forms of big game are important. During the past twenty years all species except the bighorn sheep have increased, but the percentages of increase vary from 730 per cent in the case of the antelope to nine per cent in the case of the mountain goat.

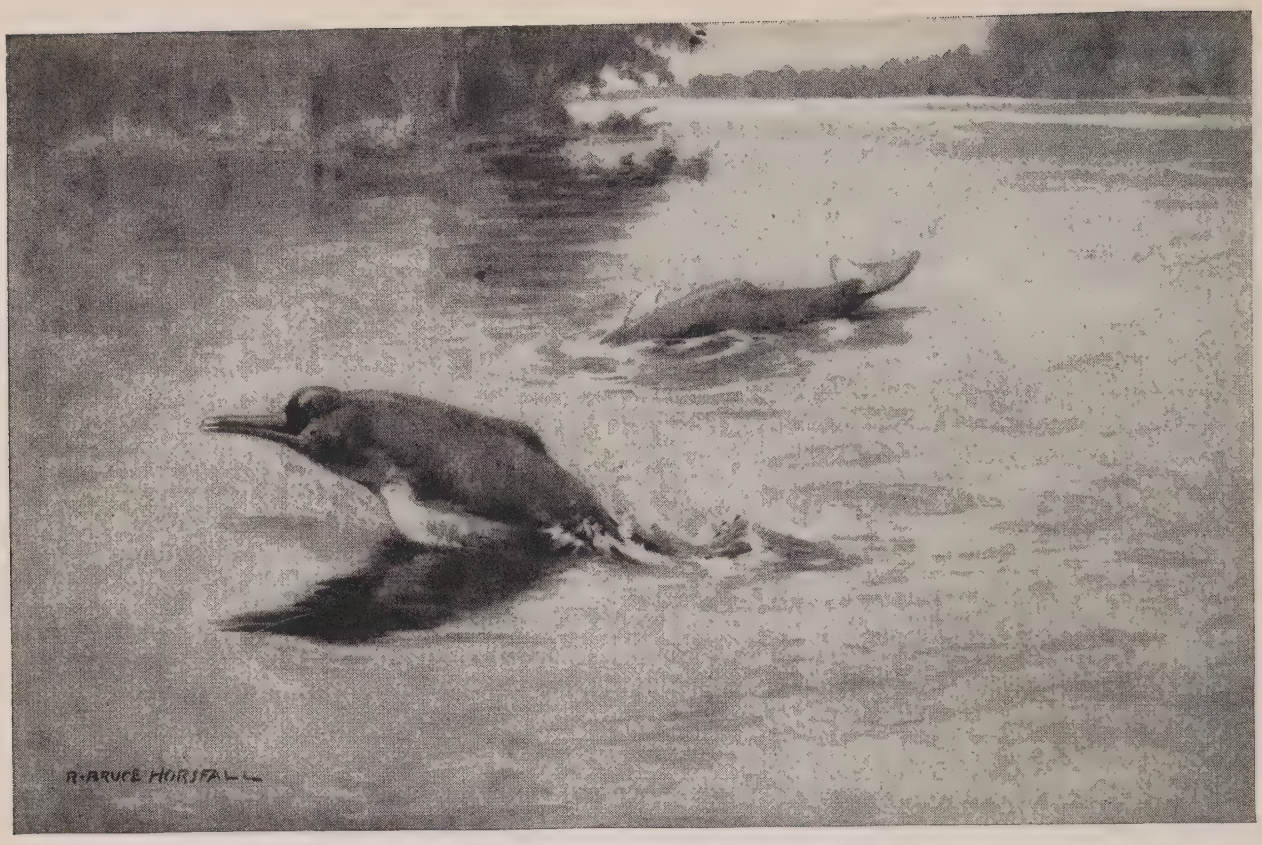
There seems, therefore, a need for more funds, personnel and authority for the wildlife administrative and research activities of the United States Forest Service. Progress has been made, because it was not many years ago that the professional forester saw nothing in the forests but board feet and cared for little else than silvicultural practices. But there is still not enough emphasis on the wildlife side, or opportunity for long-range planning based upon scientific knowledge. Foresters, sportsmen and the public in general should not underestimate the place of National Forest wildlife in all wildlife conservation.

•

STOUT-HEARTED INDIVIDUAL

By OSCAR OSTLUND

Cedar, on the storm lashed rocks. Alone;
What fortitude enabled you to rise?
What prowess have you, solitary, shown?
Whoever learns your epic shall be wise.



INIA, FRESH-WATER DOLPHIN OF THE AMAZON
This dolphin is quite plentiful in the waters of the great river. Adults are from seven to eight feet long, bluish in color above, shading to a pinkish tone beneath

BOTO OF THE AMAZON

By ARTHUR H. FISHER

Illustrated by R. Bruce Horsfall

When dolphins or porpoises are mentioned, one naturally thinks of these miniature whales suddenly appearing from the emerald spume to put on an aquacade about a ship's bow with all the dash and happiness of children at play. Certainly this must be the general impression of most travellers, for in only a few great rivers of the world are the truly fresh-water dolphins found. To one privileged to travel the silent reaches of the Amazon and its tributaries dolphins become a familiar sight. Here, however, their performances are less impressive than on the high seas, for they travel in pairs and not, like their pelagic cousins, in schools.

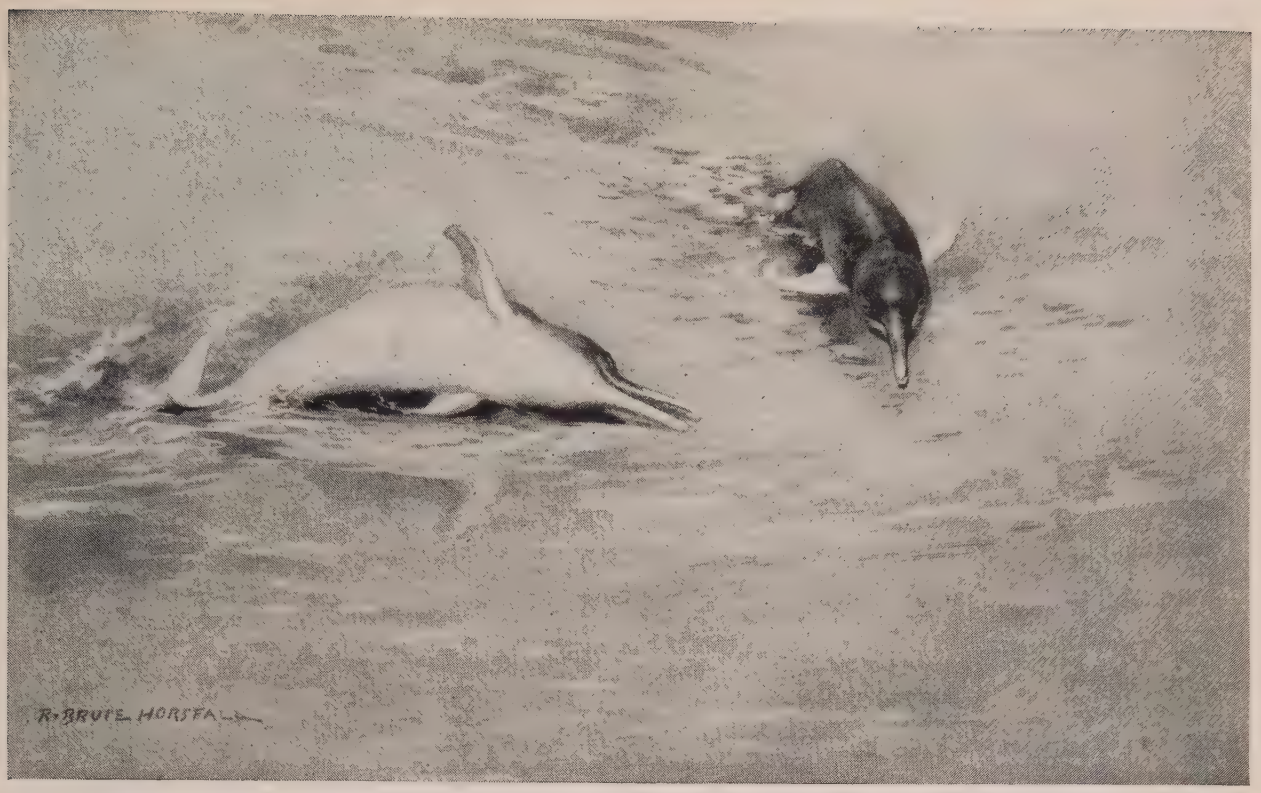
But what they lack in the interest that goes with wide-wandering they make up in an aura of legend and superstition that grips the imagination of every explorer who invades this land of mystery and paradoxes.

To science this dolphin is known as *Inia geoffrensis*—to the native it is the *boto*. It attains a length of about eight feet, and occurs in practically all the navigable branches of the Amazon, a river system that embraces about one-tenth of all the running water on the globe. It occurs also in the Rio Plata, and in several other large South American rivers. Other species of true fresh-water dolphins are found in several large rivers in India, and in Ting-ting Lake, an enlargement of the Yangtse-Kiang, in central China.

It may seem strange that so few scientific expeditions have brought out specimens, and that the species is still so rare in our important museums. Reliable data relative to the *boto's* history is also almost negligible. That it travels in pairs, varies in color from bluish-black to pink, and probably subsists on various species of catfish is about the limit of available information dealing with *Inia geoffrensis*. But the reason why so little is known of the habits of the animal can readily be understood by anyone who goes to the Amazon in quest of *botos*.

My first and decidedly remote contact with *Inia* was in an obscure jewelry and curio shop in Para, the commercial gateway to the Amazon. There my attention was attracted to a dull, unattractive, dried-up object about the size of a large pea. It was set in a rather artistic gold band to form an amulet or watch charm. Naturally I was curious as to why gold and effort had been expended on such a lustreless, uninviting thing. So I asked.

The native shopkeeper took it tenderly from the case and placed it in my hand. It looked even more unattractive



THE DOLPHINS OF THE AMAZON AT PLAY

Strange legends are told of them, superstitions that make it all but impossible to get a native to kill one. This makes it difficult for the collector, who is tantalized by their numbers

at close range than it had out of reach in the show case.

"That," said he, "is a *boto* eye. Do you know the *boto?*"

I replied that I knew what it was, and hoped to know it better, but that its eye so far had not stirred my interest.

"Ah, *senhor,*" he exclaimed. "If you know about *boto* you should know about its eye. All the natives of the Amazon know the power of the *boto's* eye. If a woman has one, she can have any man she wishes. They are helpless to resist its charm."

My apparent lack of interest in one of the many myths typical of the border of every wilderness possibly offended the jeweler. In a short time it was all but forgotten, and would probably have so remained had it not been for a far more amusing occurrence a few weeks later, when I was successful in securing my first and only specimen of *Inia.*

When I reached the Rio Tapajos, that grand river that flows into the Amazon about five hundred miles from the Atlantic I set out to find a fisherman to accompany me in quest of *botos.* The dolphins seemed to be quite active about the mouth of the Tapajos; nor was there any scarcity of fishermen who could use a harpoon. Unfortunately there was also no scarcity of superstition, and here came the rub. The native fishermen claimed that evil days befell anyone who killed a *boto.* When I offered generous pay, some made evasive promises to be on hand next day, but it was always *amanha, amanha,* and tomorrow never came. They told of *botos* appearing on the banks of the river in the form of beautiful sirens; that these sirens lured men into their embrace, only to plunge under the dark waters with their victims, who were never seen again by mortal eyes. So the days passed with nothing but native fiction in my bag. And I knew that the museum wanted a specimen.

It was exasperating to see fine specimens every day, and to be frustrated in securing at least one skeleton for scientific study. To shoot one with a high-powered rifle was a comparatively simple matter, but this could be nothing but wanton slaughter, since it would be impossible to recover the body. And this, by the way, was reminiscent of the sorry sights I had seen more than once at sea; grown men taking random shots at a school of porpoises and calling it sport. However, I felt that I was quite justified, even as a conservationist, to add at least one specimen to the collections of the Smithsonian Institution. So I patiently continued my quest, offering a prize of 200 milreis—then about twenty dollars and a fortune to a native fisherman—for an adult. It was milreis versus superstition, and superstition lost.

One morning just as I was dressing for breakfast, a native, much out of breath and in quite a state of excitement, burst into my room with the information that I owed him 200 milreis. "*Uma boto grande,*" he gasped with accompanying gesticulations that indicated that a leviathan awaited my inspection. I gave him 20 milreis on account, as a temporary sedative, and sent him after my canoe boys. They were soon on hand and we were off down stream, with the fisherman leading in his own canoe. After travelling about three miles we came upon the prize, attached to a harpoon line made fast to a tree. It was indeed a fine specimen, and I gladly paid the balance of the promised money. With profuse thanks that fisherman was on his way. I never saw him afterwards.

The dolphin had been towed in close to the shore of a cove with a hard, shelving, sandy beach. I had often noticed this spot, with its four or five palm-thatched huts

tucked away on stilts under the latticed emerald shadows of the forest's edge, dreaming away the days with little sound of life save the metallic chirp of insects gloating in the tropical heat. This morning, however, all was different. The tiny settlement seemed to have suddenly awakened from long slumber. A babble of voices now drowned out the notes of insects, and as we neared the shore we were greeted by the shouts of more than a dozen natives. They seemed much excited, and, while most of them were women, all were willing to lend a hand in hauling the heavy animal high up on the shore.

Up until this time there was not a vulture within sight, but we had hardly begun to cut away the flesh in preparation of roughing out the skeleton, than the black vultures were in attendance; hundreds of them, fighting for the flesh as it was tossed to the water's edge. Whence their clue to the feast and whence they came out of the clear blue will always be a mystery to me.

As the dolphin lay on the beach, I was at first puzzled and then greatly amused as the women slyly examined its small, pig-like eyes. Then I remembered the shopkeeper in Para, and his claims for the *boto's* eye. One of the women would coyly sidle over and gently poke her forefinger against one of the eyes, then scamper back to join the rest amid the laughter of the women and the jibes of the men. I was soon to learn that the natives of the interior really take the potency of such a fetish seriously. When the flesh was being cut away from the dolphin's head, the bolder damsel who had poked the eye implored me to give her one. I did, but told her I thought I had better take the other with me as a gift to a spinster who had been slighted in the matter of pulchritude. She was greatly pleased, and surrounded by a bevy of giggling Eves, she wrapped the eye carefully in a large leaf. I thought that this would end the excitement, but far from it. As the work of roughing out the skeleton proceeded, I was conscious of a new commotion. Looking up I saw a newly-arrived man of middle-age chasing the woman to whom I had given the eye.

Could I believe my eyes? Was that fetish really working? It surely was, but in reverse.

Round and round the huts he pursued her. She had little difficulty in eluding him, while the laughs and taunts of the others seemed to add to his discomfiture. Failing in the chase, he appealed to me.

"Please, *senhor,* get that eye back from her. She is my woman. She will have all the men coming to my door."

I told him I could not catch her any better than he, and so he disappeared down a forest path, grumbling as he went. The other eye went to the vultures, and the day ended without further excitement.

A few days later I was passing this same settlement, and saw the owner of the eye waving to me as my canoe came abreast of her hut. Whether she held the charm in her hand as she waved I cannot say. Perhaps my receiving set was not tuned in on the right wave length, or perhaps her man had taken it while she slept. I do know that no signal reached me over the tropical ether, and I fear that my faith in the efficacy of the *boto's* eye is as dead as the skeleton that is now in the whale collection of our National Museum.

•

AGATE BRIDGE

By E. E. STANFORD

PHOTOGRAPH BY MARY L. STANFORD

NEARLY two hundred millions of years ago, when giant reptiles and enormous salamander-like amphibians played in the mud where now is Arizona desert, a huge tree fell. Above it more mud gradually collected and later became compacted into sandstones and shales. Silica from the water penetrated the buried log. Particle by particle, cell by cell, the wood was replaced by solid, multi-colored agate.

Elevations and climates changed. Water and wind cut away the sandstones and shales, but uncovered and left unchanged the sterner substance of the old tree. It was too good a timber for Nature to waste. With recurrent torrential desert rains she dug an arroyo under it—an arroyo now some forty feet wide and thirty feet deep. The whole log is 110 feet long and about four feet through at the base. The Agate Bridge of the Petrified Forest National Monument is probably the longest thing of its kind in the world. It should last for millions of years yet. But hasty man builds bridges of concrete and steel, more durable than wood, more perishable than agate. He cannot wait.

PHOTOGRAPH BY ARTHUR H. FISHER

THE WOOD DUCK, FOUND NOWHERE IN THE WORLD SAVE IN OUR EASTERN AND SOUTHERN STATES, AND IN WESTERN CANADA AND OUR PACIFIC STATES, HAS ENJOYED RESPITE FROM THE GUN SINCE 1916, BUT HAS NOW BEEN BETRAYED BY ITS SUPPOSED FRIENDS AND RETURNED TO THE SHOOTING LISTS OF THIS YEAR

Our Endangered Game Birds

By EDWARD A. PREBLE

WITHIN the past few weeks I have read with some care most of the books on North American wildlife conservation that have been published within the past ten years. In none of these do I find any adequate discussion of a number of species of our game birds that are becoming dangerously scarce. Authors (and publishers also, it seems) seem to wish to emphasize the methods that are popular with gunners, and to ignore the potent fact that certain species, formerly abundant, continue to decrease under current methods of protection. Any discussion, they seem to believe, should be mainly optimistic. "We have saved our game, and we can do it again," was a popular declaration of a certain class of conservationists twenty years ago. To protectionists of the wishful-thinking school, it still sounds much better than the warning: "The species that were still common when the wild pigeon and the Eskimo curlew became extinct are now becoming rare; let us stop killing them."

In the space now available it is manifestly impracticable to present more than a brief discussion of most of the species; also—it is well to remember—the list might well include several others.

Although the Fish and Wildlife Service and the organized groups of waterfowl hunters seem to take it for granted that the current program of refuges and periodical estimates of waterfowl populations ensure a steady increase of these birds, many conservationists are not so optimistic. The article, "Wildlife Conservation—1941 Brand" in the August-September NATURE MAGAZINE, presented evidence that our systems of financing protection of migratory birds are such that closed seasons, even on endangered species, are next to impossible to achieve. Since 1937, total protection has been removed from four species of ducks—the canvasback, redhead, ruddy and bufflehead—without any reliable evidence being offered that such action was justified, and this year another species, the wood duck, which has been on the closed list since 1916, has been added to the shootable list on the recommendation of the House Committee on Wildlife Resources. This removal of protection seems to have been granted to the hunters because they could not tell the species apart. One might well ask, however: How can an ignorant hunter distinguish three canvasbacks, or a wood duck, in his bag any easier than one, or ten?

In a recent bulletin on waterfowl, "Gambling with the Ducks" (No. 82, February, 1941), issued by the Emergency Conservation Committee of New York City, certain trends affecting waterfowl administration are discussed. The claims there made appear to be substantiated by the developments of the past few years. The author of this bulletin believes that the Federal Wildlife Service wishes to do a good job of waterfowl protection, but says: "Dr. Gabrielson is under constant pressure for relaxation of all regulations. It is self-evident from the nature of the pressure and the nature of the recent relaxations that one has caused the other. For instance, the possession-limit was doubled after the Special Committee on Wildlife Resources of the House of Representatives (actually a pressure body for the big killers) reported favorably on a bill to compel such action. . . . The least that can be asked for by conservationists in the way of general policy is that Dr. Gabrielson and his new chief, the conservation-minded Secretary of the Interior, Mr. Ickes, shall call a halt to the dangerous practice of yielding to pressure, and trusting

to luck." It is urged that shooting stop December 15; hunters to be limited to one geographical zone; no further surrender to pressure; no open season for the wood duck. These are all reasonable requests, and would go far in ensuring needed protection. Recent trends, however, leave little hope that they will be granted; indeed, the wood duck is now on the open list. Nebraska, however, still forbids its shooting, an example that we hope will be followed by other states.

Two forms of geese, the Ross and the eastern brant, are still on the protected list, and should remain there. Another, the cackling goose, a small form of the widespread Canada, breeds only in a restricted area in Alaska, and winters chiefly near or on the Tule Lake refuge on the Oregon-California border, where it is reported to be shot in excessive numbers. It formerly received total protection, but was removed from the list because of the difficulty of distinguishing it from other forms. The interesting Ross goose, little larger than a mallard duck, was first distinguished as a species about 1770, by Samuel Hearne, who knew it on Hudson Bay and the region of Coppermine River, and described its peculiarities in 1795. Yet it was not formally described until 1861, and its breeding ground eluded all search until 1939. It nests only in a restricted area, and has no close relatives anywhere in the world. At present it is supposed to number only about 5000 individuals. So interesting a species should receive all possible protection forever.

It goes without saying, of course, that the National Audubon Society is always on the side of the birds. It was a pioneer in setting aside sanctuaries for particular species, and is now the special guardian of many kinds of non-game birds that have suffered by the same hands that have so sadly reduced our game species. In the matter of urging closed seasons for endangered species, this society has been a persistent worker. It maintains a sanctuary and summer school for Nature students, and has fostered certain projects for the protection of mammals. However, its influence is insufficient to overshadow that of the organized gunners and the commercial interests that are fostered by blood-sports, and it deserves more assistance.

Although the trumpeter swan has been under nominal total protection since 1918, it does not seem at present to be increasing in the United States. Always subjected to more or less killing by hunters through ignorance or indifference, it now appears to be further threatened by lead-poisoning, and this, ironically enough, even on a refuge established for its special benefit. Shooting on any area that is reputed to be a sanctuary is a mockery, but when it increases indefinitely the danger to a species so precious as our great trumpeter, the limit in absurdity seems to have been passed. Our whistling swan also has been subjected to this subtle danger for many years, and any attempt to justify the further maintenance of shooting on any sanctuaries in the country seems to be too ridiculous for consideration.

A project recently sponsored by the Emergency Conservation Committee was a lecture campaign by a competent naturalist to further protection of the trumpeter swan in the northwest. It was recommended that the season on all white geese be closed, since swans are frequently shot in mistake for geese by inexperienced gunners. We note also that the Committee on Bird Protection of the American Ornithologists' Union has made recommendations of similar import, in urging that no shooting of white geese be allowed in the Sacramento Valley. It is very gratifying to observe that a petition signed by upwards of 3700 adult residents of Idaho, and sponsored by Senator D. Worth Clark, resulted in a closed season being declared on all white geese throughout the state, thus granting needed aid to both these geese and the hard-beset trumpeter.

Of all our groups of birds classed as game, it is probable that none are more seriously threatened than our native grouse. Their almost strictly sedentary habits have rendered them particularly subject to the increased dangers that are the natural result of the efforts of a horde of shooters able to travel ten times as fast as those of a generation ago. The result has been what might have been expected from the history of game destruction in all countries where the inventions of man have been made available. Following the bow and arrow came the matchlock, flintlock, percussion cap, breechloader, repeater, and automatic. The two last are retired in part, but the gain thus made is nullified by the added destructiveness that the automobile and airplane have contributed. Pity, nor mercy, nor prudence, on the part of states or individuals, have wrought any appreciable beneficial effect. On the contrary, more state licenses have been sold as the hunters found themselves able to travel farther afield. Where formerly the horse and buggy took the hunter to coverts only a few miles away, he may now motor before breakfast to the next state, or perhaps through it, to more remote hunting grounds.

The custom of opening the grouse season before the young birds are fully fledged has contributed to the downfall of several species. A single instance will serve to illustrate this point. A release of the American Game Association, issued early in August, 1931, reads as follows:

"Sage hens of Montana can thank only their toughness if they are bothered by hunters' guns this year earlier than usual. Sportsmen of two counties complained in force that old sage hens—some turning it about to read 'sage old hens'—are too tough for cultivated appetites, while young hens are sweet morsels of delight. They asked for a special early season and got it, effective on August 16, 17 and 18—the fish and game commission sympathizing so greatly as to offer the same special season to other counties on application."

Not only other counties of Montana, but of Wyoming as well, were accorded this "special season." Several men intimately acquainted with the sage grouse areas in these states told me that hunters were thus enabled practically to wipe out the young birds in these three days. Already knowing the location of a number of broods, they would start off at daybreak to certain coverts, shoot their limits

from the covies of the poorly-fledged, slow-flying birds, and be back to town by breakfast. This performance might be repeated on the two days following. Anyone who has witnessed the labored flight of these heavy young birds, their bobtails affording them almost no steering power, can easily visualize what havoc would result to the sage-grouse population from a three-day onslaught on the covies that were raised within 50 or 75 miles of any populous town in the sage-brush region.

The record of sage grouse open seasons in the twenties and early thirties in the six states that carry the bulk of the surviving population affords the following significant notes, illustrating clearly this deadly custom.

WITH NEARLY HALF OF THE ALREADY SERIOUSLY REDUCED POPULATION SNUFFED OUT BY THE UNUSUAL COLD OF THE WINTER OF 1939-1940, THE WOODCOCK UNQUESTIONABLY DESERVES TOTAL PROTECTION FOR A TERM OF YEARS. IN FACT, IT IS APPARENT TO MANY THAT IT MUST HAVE THIS PROTECTION IF IT IS TO SURVIVE, YET NO SUCH GUARANTEE OF THE FUTURE OF THIS BIRD IS TO BE FOUND IN THE MIGRATORY BIRD HUNTING REGULATIONS ISSUED FOR 1941 SHOOTING SEASON

Colorado: 1920, Aug. 15 to Sept. 1; 1921, closed to 1924; 1924, closed to 1926; 1926, August 1-15; 1927 to 1928, Aug. 1-15; 1929-1931, closed; 1932, Aug. 1-15; 1933-1936, Aug. 15-20.

Idaho: 1920, Aug. 15-Sept. 30; 1921-1922, Aug. 15-Sept. 15; 1923, Aug. 1-31; 1924, Aug. 16-31 (some exceptions); 1925 and 1926, Aug. 15-Sept. 15, Aug. 1-31 (certain counties); 1927, Aug. 1-15 or Aug. 15-Sept. 1 (certain counties).

Montana: 1920, Sept. 15-30; followed by two closed years; then followed five years with about 10 days' shooting in September.

Oregon: 1920, July 15-Aug. 31; 1921, Aug. 1-31; 1922, July 15-31; 1923 and 1924, Aug. 1-15, followed by three closed years. (Gabrielson and Jewett, in their recent book on Oregon birds, state that the species was common in the Hart Mountain area until about 1920, but has since been hunted almost to extermination.)

Wyoming: From 1921 to 1924, Aug. 1-15.

Utah: Season closed for all grouse from 1924 to 1927, and apparently ever since.

One lacks heart to continue to study figures that show such dire poverty in the numbers of this remarkable species. We note that Colorado now proposes to make a scientific study of the sage grouse. We would say that such a study need not take long, if the cause of its virtual disappearance is sought. Formerly found in great numbers throughout the vast range of the black sage, it is now reduced to scattered remnants. Its natural enemies allowed it to exist in abundance, but man has almost destroyed what the wolf, the coyote, and the bobcat spared.

Men in position to know the facts assured me several years ago that nearly all our western mountain grouse were virtually gone. Nevertheless, in 1936 the following open seasons on blue or dusky grouse were current:

New Mexico: Oct. 1-10, five a season. Montana: Fifteen days between Sept. 16 and Dec. 31, on request of any county board, with a bag limit of three. Idaho: Aug. 10-25. Washington: Certain counties Oct. 14-18.

A cursory review of the open seasons allowed on blue grouse in the 1920's and early 1930's indicates a general scarcity of the species, and the brief account in Gabrielson and Jewett's recent work on Oregon birds gives no special encouragement as to the prospects of this species, or, indeed, of any of the native upland game birds.

Our ruffed grouse, formerly abundant from the Atlantic to the Pacific over most of wooded Canada and Alaska, and in our northern states, and by many considered as the "king" of American game birds, has declined tremendously during the last 40 years in all our states. In 1901, 41 states, including the District of Columbia, harbored ruffed grouse in sufficient numbers to grant the hunters open seasons. It is certain, however, that in several states on the southern border of the bird's range, its place on the current game lists arose more from the hope that some existed in the coverts than from any conviction that enough remained alive to warrant open seasons. In five of these states—Kansas, Wyoming, Colorado, Utah, Idaho and Washington—the open season began on August 15, and, in all except Kansas, extended to December 1. This early opening probably arose from the desire to have a uniform season for all species, for this was the period of long seasons. By 1910 seasons had shortened perceptibly and the general trend of the species everywhere from then on has indicated a decline. In the few states that now publish approximate figures on the kill, average number per hunter is so small as to indicate a scarcity that would warrant complete protection rather than open seasons. In central New Hampshire, a section to which I have given much attention, and where ruffed grouse used to be exceedingly abundant, there has been no population that

could be considered normal since 1921, although the habitat has suffered in no noticeable degree. Each summer reveals only a few broods in the area surrounding my summer home, and their pronounced scarcity after the hunting season is very discouraging.

A few notes culled from the reports of the annual Christmas bird census for a few states are rather significant, as these reports may be taken as indicating trends in game bird population. In Pennsylvania, in 1940, seven parties reported thirty ruffed grouse seen during the day, an average of one grouse to each observer. In Ohio, only one person reported grouse, three being seen. In Rhode Island, a state which certainly could not be expected to have many grouse under present-day conditions, twenty-eight observers saw two grouse. Ohio has had no open season for several years, but Rhode Island, as late as 1936, allowed two months' hunting of ruffed grouse, apparently being indifferent to its fate. Christmas census records in several other northern grouse states in 1940 are too scattering to repay analysis.

In discussions of the causes for the progressive disappearance of this species in our formerly populous states, a variety of reasons have been advanced, but Forbush years ago, by correspondence with a large number of observers, mostly hunters, proved conclusively that gunning is the principal one, since the hunters themselves, in most cases, gave this as the main cause of diminution.

The outlook for several other species of native grouse seems to be so poor that it appears useless to attempt to discuss them in detail. The pinnated grouse or prairie chicken presents a case so nearly hopeless that apparently no measures save a few large preserves established for its sole use would offer any possibility of its survival. Its treatment ever since the West was first settled has been so shameful that anyone may well blush for his race. The extinction of the passenger pigeon hardly approaches in sheer heartlessness the sad record of this splendid bird. The survival of the southern race is now admitted to be hopeless, and the rest of the story seems to be only a matter of time, in those states that permit its hunting.

The sharp-tailed grouse, a more northern species, with a smaller range in the United States, holds little hope in our states. Migratory to an extent that seems to be ignored by game officials, it usually has to face the guns of successive communities. Its status in Oregon is admitted to be precarious, and here, as in most of the grouse states, it is apparently on the closed list. However, Idaho, in 1936, still allowed its shooting for fifteen days in August, an indication that hunters wish to eat the full-grown but almost helpless young. I note that various Christmas census observers observed about 175 sharp-tailed grouse in various parts of North Dakota in 1940. They were almost certainly migrants from Canada.

Who knows how many spruce partridges or Franklin's grouse still survive in the few states where these beautiful "fool hens" are trying to hang on, and what game commission knows or cares anything about it?

While the survival of the bobwhite quail as a wild species is not seriously threatened, since it has enlisted the interest and sympathy of so large a proportion of our more intelligent citizens that it is unthinkable that they would ever allow it to be exterminated, I feel that it deserves brief notice. For many years it was cited by the gunners as a bird that required shooting to survive, but Ohio has taught the country that it needs no such help. Its hunting there has been forbidden since 1913. Calculations by impartial scientists show that in 1908 there were only about 650,000 birds in the state against an estimated normal population of 1,700,000. By 1931, with shooting forbidden, there were about 3,350,000. About every two years the gunners have tried, in every conceivable way, to have hunting restored. The latest attempt, still unsuccessful, was in January, 1941. Ohio's farmers and naturalists are still able to keep their quail.

One of the latest reports on the bird, *Bobwhite Quail Propagation,* has just come from the Fish and Wildlife Service. "Foresighted citizens have come to realize that wildlife needs help," say the authors, and so they tell us how to raise bobwhites in captivity, not divulging that several eminent game bird experts have recommended natural rather than artificial production.

Since several of our quail-producing states, with all the "help" of this kind they are able to give to "wildlife", are still able to allow their thousands of hunters only a fraction of a quail apiece each year, it would seem that Ohio has chosen the better part. How anyone can raise such gentle, trusting birds as bobwhites, and then turn them out to serve as gunfodder, even at $1.50 each or $5.00 a pair is beyond the understanding of most people.

The wild turkey, once found from New England to Florida, west to Minnesota, Colorado and New Mexico, was so tempting a mark that it suffered early diminution, and is now restricted to the wilder parts of a few of our southern and western states. Its scattered distribution, and the fact that the majority of the flocks are strongly infused with domestic blood, make it a difficult subject for discussion. Undoubtedly, if we were sufficiently interested in a species so interesting and beautiful, and so closely identified with the economics of pioneer days, the bird would be everywhere protected. This idealistic attitude, however, is so poorly supported that our bird will doubtless be pre-

Among the agencies sincerely interested in the perpetuation of our natural resources—both zoological and botanical—is the Emergency Conservation Committee, of which the chairman and chief sponsor is Mrs. C. N. Edge of New York City. This Committee has worked for some ten years, with the cooperation of several of our best-informed protectionists, and is helpful in many ways. Like the late Dr. Hornaday with his Permanent Wildlife Protection Fund, Mrs. Edge plays no favorites, and does not mince words. In fact, this Committee may be considered as the successor to Hornaday's, since the two worked in harmony for years, and until his death. It is our understanding that the funds that make possible the Committee's many contributions are raised entirely by Mrs. Edge's own efforts.

served only in parks and in the hunting preserves of private individuals and clubs.

There is no American bird that more surely deserves total protection for a term of years than our American woodcock. Belonging to a group of snipe modified for life in the woods, found only in a relatively small area in eastern North America, difficult to observe because of its nocturnal habits, it is practically unknown to most of our people. Many writers, for want of better acquaintance with the species, call it a mystery bird. As a matter of fact, the greatest mystery about the bird is that it has been able to survive so long since its alarming status was widely publicized in 1904. More than twenty years ago the Biological Survey's chief game warden concluded, as a result of a wide-spread investigation, that a closed season was justified. However, no serious efforts were ever made to remove the bird from the shootable list, although seasons and bag-limits were shortened and lowered from time to time.

THE ATTWATER PRAIRIE CHICKEN OF OUR SOUTHERN PLAINS IS APPARENTLY IN ITS LAST DAYS, FOR EVEN THE FEW BANDS THAT SURVIVE ENCOUNTER SEVERE AND PERHAPS FATAL COMPETITION FROM GRAZING CATTLE. EFFORTS ARE BEING MADE IN BEHALF OF THE BIRD, AND THE CLEAR WARNING OF ITS DANGER HAS BEEN SOUNDED, BUT ALMOST CERTAIN DOOM FACES THIS INTERESTING RACE

In January, 1940, unusually low temperatures on the bird's main wintering grounds in Louisiana and Mississippi destroyed almost half the stock, and the open seasons were reduced to 15 days. Since the effect of this action was not known, the regulations for the 1941 season were awaited with interest. Following is the gist of the current regulations, as released by the Wildlife Service in August:

"No changes have been made in the length of woodcock hunting seasons since last year. The shortened seasons of 15 days, introduced in 1940, continue . . . because the woodcock population has not recovered from the severe reduction in numbers caused by storm disasters in January and April, 1940.

"Investigations in the eastern States and Maritime provinces, where the woodcock summers, indicate that the population is still below normal. . . . While the investigations showed that the numerical status of this bird is somewhat improved in certain parts of its breeding range . . . the extent of the improvement is rather disappointing and it is thus necessary to hold the take to a minimum."

The 15-day season for 1941 begins in most of our border states on October 1; progresses in our middle states to October 15 or 20; farther south moves up to November 1, and finally in Louisiana and Mississippi, where the bulk of the woodcock population winters, to December 15. Thus the migrating birds from Canada and our northern states are exposed to legal gun-fire for three months. Bearing in mind the lack of restraint that was exhibited by the hunters of the Gulf States while the birds were starving and freezing in January, 1940, it is hardly surprising that during the first year "the extent of the improvement is disappointing," or, as Canada's Resources Bulletin, with its usual deference to the country where the bird must winter, expresses it: "The woodcock is not yet out of danger."

We predict that a similar disappointment awaits the observers of 1941-42, and suggest that a closed season or two be tried while a fair breeding population of this remarkable bird yet remains.

Investigations in the field, backed up by rather extensive correspondence with friends in southern Canada, convinced me several years ago that our once abundant and wide-ranging Wilson snipe is greatly diminished, and is in sore need of drastic protection. Its plight came first to my attention in the summer of 1934, when I spent a month on the lower Athabaska in central Canada, a section with which I had become well acquainted between 1901 and 1907. Soon after I entered the region in May, 1934, by way of the Edmonton-Clearwater River railway, I was struck by the greatly diminished number of breeding snipe. Wherever this bird is nesting the males herald their presence by their winnowing, a sound that under favorable circumstance can be heard for a half-mile or more, as it is made while they circle and dip high in the air in their mating evolutions. My interest in the bird led me to be on the alert for this sound. The result was disappointing, for in nearly a month of observation I heard certainly not more than eight or ten of these birds in a canoe voyage through a section where in former years the birds were observed daily in such numbers that we gave little heed to exact counts.

Reference to recent books on conservation revealed little or no note of any diminution in numbers. It was in the works of Forbush, 1912, that I found evidence that this falling off in numbers had been going on for many years. From correspondence with many persons from various localities in Massachusetts, he found that 109 out of 120 observers, with an average experience of 23 years, reported an average decrease of 67 per cent. This is a good illustration of the vision and interest of this remarkable man.

Yet when he died, after serving for years on the Migratory Bird Advisory Board, his place was given to the game warden of a state that raises practically no migratory birds, but harvests a lion's share of them.

In the period of complacence that followed the passage of the migratory bird law, little attention was paid to the warnings of Forbush or of anyone else. Waterfowl occupied the center of the stage, and other migrants were all but ignored, although the daily bag-limit on snipe was reduced gradually from 25 to 20, and finally to 15. Even when waterfowl enumerations were emphasized in field studies, the status of the snipe apparently received no attention, since the reduction in numbers was not recognized. And a puzzling feature was the fact that the record of numbers killed in the few states that require returns of game kills showed bags of fair numbers.

Correspondence with Frank L. Farley, ornithologist of Alberta, Canada, revealed a rather startling condition of affairs. He wrote that in the western prairie region of Canada the Wilson snipe has become so scarce that many of the newer settlers do not know the species, but class all the larger long-billed shorebirds as snipe. A neighbor lady near his home in Camrose, a year or two ago, proudly showed him a number of birds that her husband had shot while hunting ducks, referring to them as Wilson snipe. They were all dowitchers and greater yellowlegs.

Mr. Farley tells me that about forty years ago, when W. E. Saunders of Ontario used to visit him occasionally, they could go out on the marshes near Camrose on any May morning and find several snipe's nests with eggs. In favorable localities nests would be found within fifty feet of each other. Regarding the bird's condition more recently he says: "The snipe was common until about 1920, then slowly decreased until last year. In 1930, I was afraid something had happened to them, as with the pigeons in the late 80's. In 1940, it looked as if they would be safe if they were given extraordinary protection." In another letter, he reports them fairly common in the Churchill region.

As regards the tendency for gunners to shoot other species of shorebirds in mistake for snipe (and I have found other references to the same fact in our west), I was interested to learn that this had come to the attention of the Canadians some years ago. In 1931, when Mr. Farley was president, the Camrose Fish and Game Association unanimously passed the following resolution:

"Whereas the Wilson's Snipe is the only shorebird which may be legally hunted under the provisions of the Migratory Birds Convention Act, and whereas many hunters, more especially juveniles, do not differentiate between this bird and other closely allied species such as greater and lesser yellowlegs, dowitchers, black-billed and golden plovers, all of which are still in this Province at the time Wilson's snipe may be legally hunted; therefore be it resolved, that this Association go on record as favouring the inclusion of Wilson's snipe in the protection given to all other shorebirds by the Migratory Birds Convention Act, and that a copy of this resolution be forwarded to the proper authorities at Ottawa and Washington."

Even if this resolution reached the authorities at Ottawa it is easy to understand why no action was taken, because the Canadians have always refrained from approving any action that might be construed as a possible suggestion that the hunters of the United States were harvesting more than their share of the game raised in Canada. As a fact, of course, the greater percentage of our migratory game birds are raised in Canada and Alaska, and shot in the United States and Mexico.

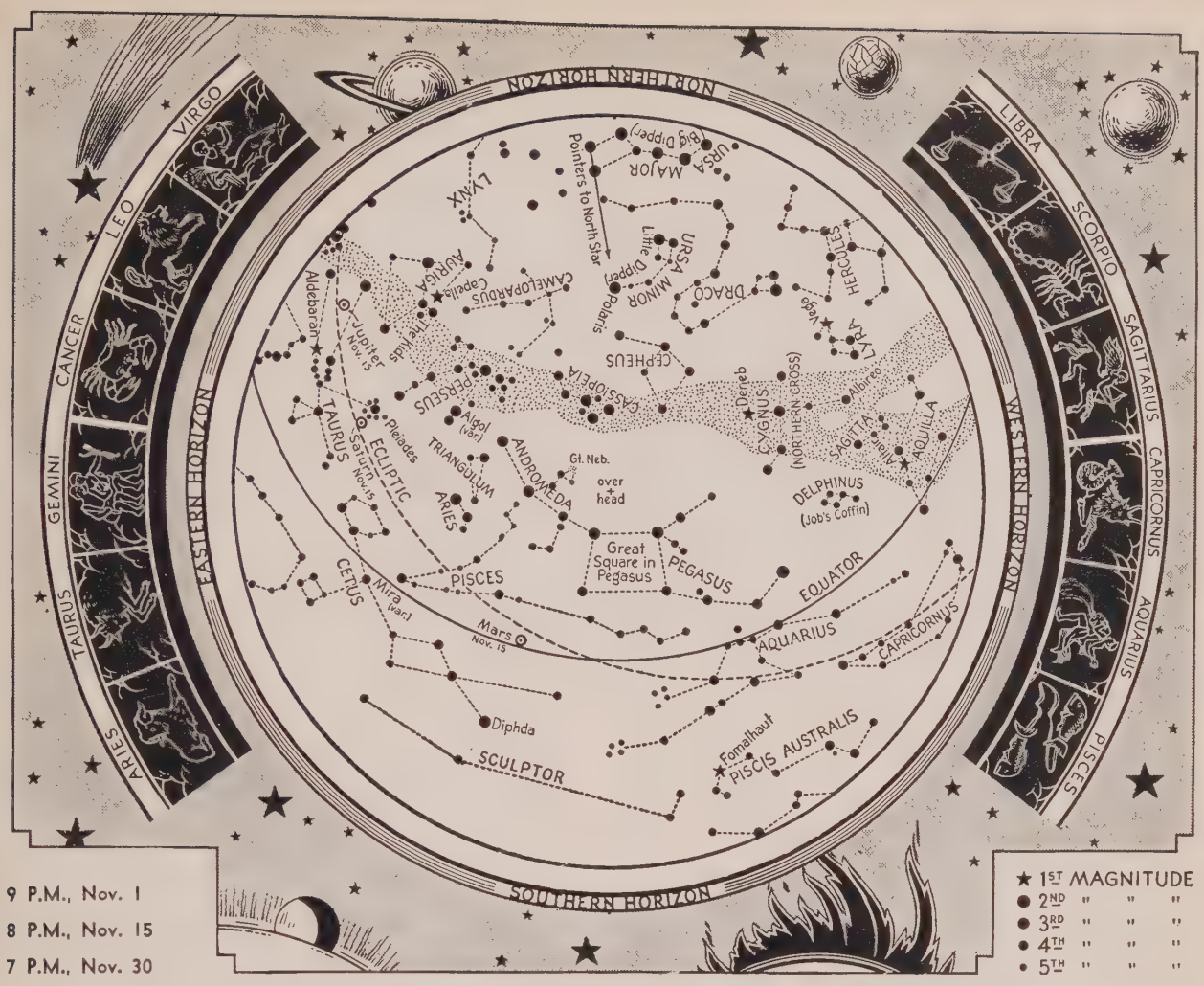
Ever since I learned by direct observation of the extraordinary decrease in Alberta's breeding snipe, I have wondered at the large numbers of Wilson's snipe reported as killed in various states in recent years. Examples at hand are: Minnesota, 1919--20,000; 1920—25,367; 1921—22,327; 1929—13,473. New York, 1923—5004. Wisconsin, 1932—94,606; 1933—70,545; 1934—36,706; 1935—17,448; 1936—38,786; 1937—33,836; 1938—32,891; 1939—57,305.

In view of the lack of acquaintance with the bird displayed by some Canadians, as well as evidence at hand as to similar conditions in our own West, I am convinced that the shooting of other shorebirds in mistake for snipe is more general than has been supposed. The inability of the average gunner to distinguish the much larger ducks, geese and swans makes it easy to understand why any large longbilled sandpiper might be considered to be a snipe by one who had, perhaps, never knowingly observed a true snipe. It is entirely in line with the well-known ignorance and indifference of the average modern hunter, contrasted with the game-knowledge that was the heritage of the experienced woodsman and market-hunter of a couple of generations past.

Since the above was written a release from the Fish and Wildlife Service indicates that the true status of this bird has at last gained official attention and that a country-wide closed season has been declared. However, since our larger protected sandpipers apparently are being shot in mistake for snipe, it seems important to publish the foregoing facts. Apparently administrators have been led by these records of kills to believe that Wilson's snipe was still abundant, and could take care of itself. In fact, authoritative reports published within a year showed no special concern for the bird. It is evident that its condition deserves a thorough study by Federal and State organizations.

North America's pigeons and doves, in common with other groups that afford "sport", have had no mercy from man, the creature that invented the word, and claims to know its meaning. Everyone knows the story of the passenger pigeon, the only species important to the Indians, who utilized its hordes in their season, and who left the teeming millions undiminished to their conquerors with the iron arm. Even then the bird survived in millions until the telegraph and the railroad were enlisted in the war against it. Thereafter the decline was rapid, until the last known survivor died in captivity in 1914.

The mourning dove, no more prolific but with a more extensive distribution, has survived longer than the pigeon. Its broader range has not helped it, for wherever it seeks a winter home it finds armed (Continued on page 523)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Planets Brilliant in November Skies

By ISABEL M. LEWIS

FOUR of the five brightest planets—Venus, Mars, Jupiter and Saturn—may be seen under very favorable circumstances in the evening sky this month. The fifth, Mercury, will be so well placed in the morning sky around November 12 that it will be worth while to rise an hour or so before the sun to see it in the southeast in the morning twilight. It is on this date that its distance west of the sun will be greatest. Mercury is always the most difficult of all the bright planets to observe because it can never get very far away from the sun. This happens to be the most favorable time of the year to find this elusive little body, smallest of all the members of the sun's planet family. Also Mercury will be unusually bright, and will outshine any object near it, so it should be easily recognized low in the southeast less than an hour before sunrise. It will be at this time much brighter than the brilliant Spica near it and silvery-white in color.

All the planets now visible in the evening sky are exceptionally bright. Venus is approaching its maximum brilliancy, which will be attained just at the end of the year and will be a glorious object to observe in the evening sky for the remainder of this year. It was after the middle of April when Venus passed from the morning to the evening sky, and it was not until June that one could pick it up with difficulty low in the west for a few minutes after sunset. Slowly, night after night, as the summer passed on it appeared a little higher in the west as the sun disappeared below the horizon. As summer passed into fall it shone conspicuously in the west for an hour or more after sunset. Even when unfavorably placed, as it was last summer, Venus far outshines any other planet, even its nearest rival, the giant Jupiter, and even Mars, when on such rare occasions, as last month, it was brighter than Jupiter for a few brief days. Even when these two planets have their greatest possible brilliancy, Venus, under the most unfavorable conditions and when least brilliant, is

nearly two and a half times brighter than they are.

Recently we received a letter from a reader who admits that, frankly, he is puzzled by the behavior of Venus. When, he asks, is this planet seen in the evening, and when in the morning, and for how long? Is Venus always visible; always unmistakable; always largest, and always brightest? Is it only so in the evening or in the morning? A book published in England, he writes, says that Venus is present for nine and a half months. Is that only in England? Does it appear the same all over the United States? As we have said, Venus is always the brightest of all the planets, whenever and wherever it is seen. It takes a little more than one year and seven months—about 585 days to be more exact—to go through all its changes in position with respect to the earth and to come back to practically the same position relative to the earth. On November 23 Venus will be at its greatest apparent distance east of the sun—its greatest eastern elongation. In a little more than one year and seven months it will again be in this same position. During half of this period, or about nine and a half months, it is in the evening sky, and for an equal period it will be in the morning sky. In the first case it is an evening star; in the second a morning star.

There are two times during the period of one year, seven months when Venus is not visible at all for a short interval, namely at superior conjunction, when it is in line with the earth and sun with the sun between it and the earth, and at inferior conjunction, when the three bodies are again in line, only in this case with the planet between the earth and sun. In both instances the planet is invisible because it is lost to view in the glare of light from the sun. It is not seen for a much longer time at superior conjunction than at inferior conjunction because it is then moving most slowly with respect to the earth and stays near the sun longer. It is moving very rapidly with respect to the earth at inferior conjunction, because it is then closest to the earth. It is remarkable how rapidly the planet moves into the morning sky and becomes visible after inferior conjunction as compared to its slowness in coming into view in the evening sky after it has passed superior conjunction. The much greater brilliancy of the planet just before and after inferior conjunction, as compared to its brightness at superior conjunction, has something to do also with the relative ease with which it is picked up near the horizon. It is two and a half times brighter when it is nearest the earth than it is when farthest from it.

As to where on the earth's surface the planet is visible, Venus and all the planets appear only near the ecliptic, or apparent path of the sun through the heavens. The zodiac, or narrow belt of the heavens, is only sixteen degrees wide—eight degrees to either side of the ecliptic—and limits the region within which the sun, moon, and planets will be found. The constellations that lie within this zone are called the zodiacal constellations. They are the ones that are represented in the drawings that appear on either side of the monthly sky maps. These constellations are visible all over the world except within north and south polar regions, where some of them, wholly or in part, never appear above the horizon. At the north pole, for example, no constellation south of the equator ever appears above the horizon, and at the south pole no constellation north of the equator is ever visible. When the planets move into the constellations that are below the horizon in these regions they cannot be seen. These unfavorable conditions no longer exist when one passes outside of the Arctic and Antarctic Circles, and in all other parts of the world all of the zodiacal groups appear above the horizon at some time of the day or night. The one thing to interfere with the visibility of the planets is the glare of daylight or strong twilight. Aside from that, the planet will be seen at some hour of the night or day. It is possible to see some of the brighter planets in daylight. All of them can be seen telescopically in the daytime and Venus is frequently visible easily to the naked eye in broad daylight. Because of the density of the earth's atmosphere near the surface neither planets nor stars are seen to the same advantage when they lie near the horizon as when they are high in the sky. For this reason the planets are seen to better advantage in the tropics than they are in high latitudes. The zodiacal constellations to which they are confined pass high overhead at the equator, but lie nearer the southern horizon in high northern latitudes and nearer the northern horizon in high southern latitudes.

After Venus has set, Jupiter is the most brilliant object in the sky, always, of course, excepting the moon. It now rises a little over an hour after sunset in Taurus, north of Orion and northeast of the Hyades. Because of its high northern declination it will rise before Orion appears in the East. It is now drawing near to opposition and is practically at its maximum brightness this month.

Saturn comes into opposition with the sun on November 17, and is at its maximum brightness. Next to Venus and Jupiter it will be the brightest object above the horizon in the early evening. When Sirius comes into view later in the night it will outshine Saturn by more than a magnitude and a half. Saturn is now in Taurus, a few degrees south of the Pleiades and west of the Hyades. There will be no difficulty in identifying it at this time from its position with respect to these two prominent groups of stars and from its brilliant yellowish color. The presence of Jupiter in this constellation also makes its appearance one of great beauty at this time. Saturn is now a magnificent object telescopically as its rings are tipped to the earth at nearly their widest angle and they are conspicuous and beautiful.

November is the month when the Leonid swarm of meteors is due to appear. This is the swarm that has its radiant within The Sickle of Leo, which rises around midnight. The meteors should appear, then, in greatest numbers in the second half of the night. The maximum display is due on November 16. They are moving rapidly and a brilliant bluish-green in color. Be sure to see them.

Barren Strawberry—Excellent Ground Cover

By W. C. WILSON

Waldsteinia fragarioides is rather a mouthful. Its common name, barren strawberry, is easier and equally descriptive. The generic name was given in honor of Francis Adam von Waldstein-Wartenburg, a German botanist. *Fragarioides* means *Fragaria* (strawberry)-like, and this thought is carried by the common name, also.

Many gardeners are continually on watch for new and useful wild flowers. The barren strawberry is such a plant. It is uncommon in cultivation, but has great merit as an evergreen ground cover. It can be used in small colonies as well, if care is taken to keep it from spreading.

Waldsteinia appears much like a strawberry at first glance. It belongs to the same family, Rosaceae, and has a similar habit of growth. There are several differences, however. It spreads by underground runners instead of those above the surface. The barren strawberry produces numerous smaller, yellow flowers in late April or early May. The new foliage appears at blossoming time. It is light green at first; shiny and much darker at maturity.

The descriptive word "barren" refers to its native habitats—dry, open, sterile woodlands and banks. This plant is noticeably rare or absent from the coastal plain but is rather widespread inland. It ranges from New Brunswick through western New England to Minnesota and south to Georgia. The barren strawberry will tolerate adverse soil and moisture conditions, but grows best in light shade with moderate moisture and enjoys an organic soil.

Wayfaring Thoughts

By OSCAR OSTLUND

The fears, suspicions and tension; the unbalancing hatreds and rivalries that agitate modern society enhance the spectacle of equanimity in Nature. The prolixity of current talk and the instruments for its amplification; the loquacious and strident warfare of isms and counter-isms enhances the privilege of stillness for which Nature has reserved so vast a tract.

• • •

Nature is the primeval wellspring of ideas that originated ahead of organized philosophies and the words used in their interpretation—protean and versatile symbols—which have the instruments for good and evil as well; for prejudice, vanity, dogmatism, malevolence, brutality and war preen themselves with symbols and gorge their appetites on rich, provocative words.

• • •

No tool of science or philosophy has ever carved into Nature's pith. Its motion is perpetual. It has no point of rest.

• • •

The immense display of the aurora borealis—swift, stupendous, sensitive, dynamic—makes no sound that is audible directly to the human ear. The deeper influences in human lives are quiet. Universal gravity is silent. It is the local, relatively microscopic thunderstorm that makes a big commotion.

• • •

The superficial thing is always close to man. Intelligence is so new a thing on this earth that he is suspicious of it.

• • •

A living philosophy has the attributes of a flowing stream, sensitive to all things in its channels; fluid, bending, flexible at the touch of roots; yielding momentarily to the smallest stone, yet ever flowing onward.

The stream suggests a test of any set of creeds, of any ideology. Does it have drainage? Is it flowing somewhere? Does it have, in its bosom, riffles that open their heart to the sun? Will it arrive; pour its substance into a larger body of water and flow without ceasing in the eternal rotation of truth?

• • •

The unconquerable philosophy is resilient, and although humble, it is more virile than a striding, arrogant, cocksure philosophy. The strength of the humble viewpoint is in the pliancy by which it accommodates itself to the endless and continuing curvature of truth.

• • •

Wisdom that moves with life must bend with life as the serpent moves.

THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALME
Professor of Rural Education, Cornell University, and Director
Nature Education, The American Nature Associati

Pan-American Nature Study

We hear so much of international problems these days that it should be appropriate to devote at least one page of this series to some phase of international Nature Study. Similar pages might deal with cordial relations that exist between American Nature enthusiasts and those of Europe and Asia, but it seems best to begin nearer home.

When the writer had the opportunity for a six week's vacation, he decided to see what there really was to this Pan-Americanism. Accordingly, he jumped into his car with his family and drove down across Florida to Key West; took the boat to Havana, and put in three weeks of Naturing from one end of Cuba to the other. His most interesting experiences were with the people of the island, and with the environment in which they live. It is hard to determine which will be remembered the longer. A similar trip to Jamaica, and other trips to other parts of the world at other times, gave the same impression. You think of the scenery and you think of the people, and you remember that both differ from the scenery and people of your own home town. But few of the differences are unpleasant ones and most of them are such that you would like to repeat them.

An easterner who visits Don Carlos de la Torre, the former mayor of Havana, and the former president of the University of Havana, also remembers David Starr Jordon, former president of Leland Stanford Jr. University. When he gets home, he gets out the pictures he has taken of the two men and he remembers little things each said and did. He knows that fundamentally there is a strong similarity in these two naturalists of two American countries.

And what holds for de la Torre and Jordan holds for the lesser lights as well. A banker in Havana who spends all his spare time collecting shells matches well with a druggist in the State of Washington who has the same hobby. An Havana doctor, with his enormous library and his private museum, matches in graciousness and good nature a Minnesota college professor who maintains his own extensive outdoor laboratory. A retired Santiago gentleman, who has most of his house turned into a miniature zoo, calls to mind the bird feeding stations, aquaria and private greenhouse corners of hosts of middle class friends in the United States. A Havana professor of zoology, who, without extra pay, launches a project for a zoological garden puts to shame many similar professional people in the States, but he definitely recalls a somewhat similar project maintained by a Georgia school man.

So the story goes. The Cubans and the Jamaicans have much more in common with us than we realize. When a professor in a veterinary college in Cuba presents your wife with a huge bouquet of flowers within a half hour of the first time you meet, you wonder how many American professors would do the same to a visiting lady from south of our border. If you have as good a sense of humor as your neighbors to the south do you can have a wonderful time with them even though you do not speak their language. If you want fun, get someone to send you a corset through the Cuban customs and then go to the customs office and try to get it from Spanish-speaking officials using English only. If you want more fun, leave your car unlocked in front of the national capitol in Cuba and come back to find much of your valuable camera material stolen. Then go to the police and try to get some satisfaction but do not get sore. Remember that you probably lost more valuable materials in your own home town more than once and also remember the exceptional courtesy that most of the police show you when you get lost in a strange land. You know down in your heart that, were the tables turned, a South American or Cuban visitor in your own home town probably would not have equal courtesies extended.

The Nature lover likes to "get about". If you have a car in Cuba, this is done easily, at least outside of Havana. Havana driving is like driving in an American college town the night after the home team won its major game, except that in Havana they do not seem to have accidents and in Havana you do not see drunkenness unless you deliberately seek it out. But Cuba does have some splendid roads, all of which lead through interesting country. The trip from one end of the island to the other will show you greater variety than you are likely to find in a similar mileage in most parts of continental United States. Of course, you have to drive slowly to avoid the pigs, the native youngsters and the holes in the road, but this is as it should be and it gives you a better opportunity to see the country than is possible along our own super-speed highways.

It is fun to take your trip to Jamaica or Cuba so that your return journey will be in the spring. You will probably travel north faster than do the migrating birds, at least if you want to keep some appointments. But as you go, in your mind's eye at least, you will feel that you are being followed by some of the home town birds that you think you saw at Santa Clara or Matanzas when you were there a few days before. Possibly it would be just as much fun to take the trip in the fall and get down there to welcome some of the birds of your own neighborhood.

One thing that a trip to Cuba does for you is to make you forget most of what you learned about the place in grade school geography. You may have the impression that its mosquitoes are terrible, but after your experiences in Florida they are tame. In fact, we slept many nights in unscreened rooms in Cuba in late April without even hearing a mosquito. The next week we were eaten alive in screened rooms in the United States. We had an idea that by April, Cuba would be unbearably hot, but except for a night in Santiago we were never even uncomfortable. We had been told that in the smaller towns, and in parts of the larger towns, we would see undescribable filth. In that we were not disappointed. But at least there seemed to be evidence that this situation was being improved. What does surprise you, though, is the way people crowd themselves together as much as possible. Picnic grounds off in the country just do not seem to exist. Tourist cabins have not hit the place yet. S instead of staying out where a naturali would feel comfortable you find yourse forced to accept a guide who takes yc through narrow, winding, rough streets some hotel in the center of the city. Her you are as comfortable as you can be in hotel, but you wish you could have a cle cabin out under a clump of royal palms yc remember a few miles back on the trail.

Of course, we do not want to make a part of the country over for anybody. B it does seem as though Cubans and Jamaica would get more fun themselves out of the environment, and make it more attractive tourists of the Nature-loving type, if th provided suitable accommodations away fro the centers of population.

To help Americans who may visit Cul in the summer, and who may wish to kno more of the country's natural history, th University of Havana offered this last sun mer for the first time a course in English c Cuban natural history. It is hoped that th venture proved sufficiently profitable to wa rant repetition because the instructor is we worth knowing, as well as is the subject h teaches. If, however, any teachers are tempte to make their plans next summer to take th trip it is hoped that they take their car. Kee it locked when it is in town, but use it t explore the hinterland whenever this is at a possible. Go west by all means to the end c the concrete highway into the "magote region. Do not fail to visit the beaches t the east of the Matanzas area. Visit the scho headquarters in Matanzas and notice the i terest the school authorities there have i natural history.

The matter of expense to a Nature lov taking a trip to Cuba is always of importanc One can live there cheaper than is likely t be the case in the States. The Nanking restau rant, just a block from the national capit building, serves meals for forty cents that w have never been able to duplicate in the State for a dollar, and, due to the exchange, th forty cents is not quite that much reall Anyone able to make the usual touri journey in the States need have no fear th he cannot live as cheaply in Cuba as he can i his home country, even considering the co of the ocean journey and providing he stay at least two or three weeks. If we are t have a united Hemisphere after the wa we owe it to ourselves to be able to under stand those who live to the south of us. Ur derstanding them means living with ther for a while in as near to the same manne that they live as possible. It means know ing and loving the same trees, fighting th same insects, cultivating and harvesting th same crops for a short period at least.

Basing my judgment on three months spen on foreign soil to the south of the Unite States border I feel definitely that if th spirit of Pan-Americanism fails it will no be the fault of our southern neighbors bu our own. It seems as though a common in terest in natural history is a splendid bon to bring people together. Many of our bird go to these southern countries each yea Some of us teachers should do it at leas once in a lifetime.

YOUR
CHOICE

of one of these popular writing instruments for only $1.00 postpaid by insured mail to any U.S. (or Canadian) address, delivery guaranteed.

Try either, or both items for 10 days at our risk. If they are not satisfactory, or as represented, return them and we will refund purchase price.

Illustration at left (2-3 size) shows our high grade safety self-filling Fountain Pen fitted with guaranteed solid 14 kt. gold iridium tipped pen.

Illustration at right (2-3 size) shows our solid 14 kt. hardened gold point safety self-filling Ink Writing Pencil. Ideal for carbon copying and all writing purposes.

Both items in an attractive satin lined gift box to one address for only $2.00.

Guaranteed against imperfections in materials or workmanship, either item will make an Ideal Gift for school opening, Christmas, birthday, or any occasion. Remit by check, P. O. or Express money order.

Laughlin Mfg. Company,
959 Majestic Bldg.,
Detroit, Michigan

NATURE BINDER

Preserve your copies of Nature Magazine in a finely-grained, dark green, gold-embossed binder $2.00

AMERICAN NATURE ASSOCIATION
1214 16th St., Washington, D. C.

NOW READY

YOUR 1941 - 1942 Winter & Spring Issue

Travel America Guide

Complete HOTEL RATES

United States, Canada, Mexico, South America, Cuba, Central America.

Tipping Suggestions. How to Get the Most from the Modern Hotel. Calendar of Events: Second half of year 1941. American Guide Series—51 New Books on Travel in U. S. Digest of Advertisers' Literature.

Zone Map showing cities and towns on Daylight Saving. Detailed Directory of Hotel Facilities, State Motor Laws, State Liquor Laws, Population Figures, Railroad Connections, Leading Industries, Points of Interest.

ALL IN ONE BOOK

Price 50c. Postage included

Send coin only to

JOHN HAYDEN
National City Bank Building
17 East 42nd Street
New York, New York

which will be returned to you if not most thoroughly pleased.

OUR ENDANGERED GAME BIRDS

(Continued from page 518)

hordes awaiting its arrival backed by laws designed to take full advantage of any increase that may have accrued from the summer's protection in the northern states. The dove-hunters of the shooting states thus have not only their local crop of doves, but the migrants from the North, where 24 states, and most of Canada's southern provinces, produce doves, but do not shoot them.

In the days when North America still had game in abundance, the mourning dove enjoyed the safety that is the rightful heritage of a bird so harmless and lovable. Frank Forester, in 1848, refused to consider any of the pigeons as game, and the early bird preservation committees of the American Ornithologists' Union gave the dove the same status. About 1886, with the growing scarcity of more legitimate game, some of the southern states gave it game status, and by 1902 certain ones permitted its killing from July to February.

In the late nineteen-twenties certain organizations in the South, realizing that many doves were being shot while they were caring for helpless young, sought to delay the open season until all the young were on the wing, but the opponents of this merciful provision produced evidence that somewhere, sometimes, doves were nesting in nearly every month of the year. Investigations showed that both sides were right in their contentions, but the hunters were given the benefit of the decision.

In 1928, E. H. Forbush, then a member of the Migratory Bird Advisory Board, told me that he was convinced that the mourning dove was following in the steps of the passenger pigeon, and that he purposed making a personal study of its status and needs. His death soon afterward prevented this, and also changed the complexion of the Advisory Board, and no benefit to the dove resulted. On the contrary, a form of open season, called the split season, was adopted to insure better results to the hunters. A season from September 1 to 30, for example, took care of the southern-reared birds, and a later one, say from November 20 to January 31, was devoted to the migrants from the North.

The "split season" was eliminated in 1935-36 in some of the more important states, but the seasons usually adopted were so long that the situation was not bettered.

So the dove has struggled on. The original outrageous bag-limit of twenty-five birds a day has gradually been reduced to twelve, and baiting has been forbidden. Some state organizations, and a few newspapers, especially those popular with farm and rural populations, have attempted to eliminate its shooting in certain states, but without success. It remained for the disastrous winter of 1940-41, when doves, as well as snipe and woodcock, perished by thousands, to bring to the authorities its serious condition. This year the Federal seasons are everywhere reduced to 42 consecutive days, although, to their honor, a number of the states have chosen not to accept this full privilege. Also, it should be pointed out that, although the Wildlife Service, in June, 1940, announced that it had discovered that opening the season on September first "was the poorest kind

Languages Made *easy* By Linguaphone

Speak SPANISH, PORTUGUESE, FRENCH—or any of 29 languages—in an amazingly short time by the simplified, direct Linguaphone conversational method. *In your own home* listen to the voices of native teachers who lead you by easy steps to speak, read and write the language of your choice. Endorsed by the foremost language teachers. Used by a million home-study students. *Send for FREE Book*

LINGUAPHONE INSTITUTE
36 R.C.A. Building New York City

Garden Craft Bird Feeder ONLY 2.00 post paid

Attract birds to your grounds with this year 'round hanging feeder. Holds full pound of feed. Roof lifts off for filling hopper. Real white pine, stained tree brown. An unusual Christmas gift! Order today.

BIRD and BIRD HOUSE BOOK!

Twenty-four pages of pictures and interesting information for bird lovers. FREE with order, or send 10c in coin.

WOODWORKING SPECIALTY CO.
151 Woodstock, Crystal Lake, Ill.

RARE CACTI

OUR BEAUTIFUL NEW CATALOG

36 fascinating colored pages NOW READY. Lavishly illustrated. Hundreds pictured and described with full cultural directions. A handbook of Cactus lore. FREE TO CUSTOMERS. If wanted for reference 10c is appreciated to cover mailing costs. A real garden hobby. For your copy Write Now!

JOHNSON CACTUS GARDENS P. O. Box 70B HYNES, CALIF.

HANDBOOK—How to Make and Use Bows and Arrows—90 Pages well illustrated (with catalog) 35c.

CATALOG—100 pictures—color spread—Instruction Folder. 10c.

CATALOG alone 5c. Stamps or Coin.

L·E·STEMMLER·QUEENS VILLAGE·N·Y·

KEEP YOUR DOGS

NEMA WORM CAPSULES

Use Nema Capsules to remove large roundworms and hookworms. Effective—Dependable.

FREE Send for Nema booklet No. 652.

Write to Animal Industry Dept., Desk N-21-L

PARKE, DAVIS & CO., DETROIT, MICH.

Drug Stores Sell Parke-Davis Products

ILLUSTRATED NATURE BOOKS

Audubon's Birds of America, 435 colored pictures, 9¼ x 12¾, a lifetime treasure	$ 4.95
Field Guide to Birds, Eastern (Peterson)	2.75
Birds of America, 8¾ x 11¼, 1000 pictures	3.95
Wild Birds and Their Music (Mathews)	3.50
Water and Game Birds (Reed), 225 pictures	1.50
John Burroughs' Works, 23 volumes	51.75
Henry D. Thoreau's Works, 11 volumes	27.50
North American Mammals (Anthony)	5.00
Strange Animals I Have Known (Ditmars)	1.69
Book of Prehistoric Animals (Ditmars)	2.00
Thrills of a Naturalist's Quest (Ditmars)	3.50
Reptiles of the World, 6¾ x 9¼ (Ditmars)	1.98
Book of Insects (Fabre), Illus. by Detmold	2.00
Field Book of Insects (Lutz), 774 pictures	3.50
Life of the Bee (Maeterlinck)	2.50
American Trees and Shrubs (Mathews)	3.50
American Wild Flowers (Mathews)	3.50
Nature Encyclopedia (Fisher), 700 pictures	1.89
Miracle of Life (Wheeler), 500 pictures	1.98
Road of a Naturalist (Peattie)	3.00
Outline of Science (Thomson), 1700 pages	3.95
Wildlife Conservation (Gabrielson)	3.50
F & W Dictionary, 455,000 terms defined, 32,000 quotes, 7,000 pictures, 2895 pages, 9 x 12	18.00

$5.00 orders postpaid, smaller orders 25c extra.

LIBRARY GUILD, 145 W. 63RD ST., NEW YORK

of management" the rules now current permit shooting in eleven states to begin on this date. So many helpless young must perish by slow starvation under game "management."

The status of the white-winged dove in the United States has been known for years to be notably serious, but the influence of sporting organizations in southern Texas and Arizona has prevented remedial action. Despite official investigations that have confirmed what private studies long ago made known—that the species is being seriously over-shot—it may still be killed in Arizona from September 1 to 15, and in Texas from September 16 to 25. Again the gunners triumph.

The fact that the beautiful band-tailed pigeon is locally detrimental to certain fruit interests has made it possible to continue its shooting. It is found only in our transmountain states and in southern British Columbia, and is now reduced both in range and numbers. The present open seasons are as follows: Arizona, New Mexico, and Washington, September 16 to 30; California, December 1 to 15; Oregon, September 1-15.

Following are listed the principal species or groups of game mammals and birds that the various states offer the hunters to whom they sell licenses. A thorough discussion of these lists would show that in many of our states the resident game has been so depleted that they must depend more and more on migrants from Canada and Alaska and on imported birds; that there is a growing tendency to consider as game certain small species formerly disdained; and that in some states that collect and publish the numbers of game species killed, the average take per hunter is so small that it is plain that the species should not be killed. These points have been discussed briefly in a previous article (August-September, 1941, p. 393).

MAINE: About 98,000 hunters. Deer, bear, varying hare, gray squirrel; ruffed grouse; ducks, geese, rails, woodcock.

NEW HAMPSHIRE: About 54,000 hunters. Deer, bear (both local), gray squirrel, rabbit (some imported); ruffed grouse, pheasant and quail (both local); ducks, geese, rails, woodcock.

VERMONT: About 45,000 hunters. Deer, rabbit, gray squirrel; ruffed grouse, pheasant (local), quail (local).

MASSACHUSETTS: 85,000 hunters. Deer, gray squirrel, rabbit; pheasant, ruffed grouse; ducks, geese, rails, woodcock.

RHODE ISLAND: About 8000 hunters. Rabbit, gray squirrel; pheasant, ruffed grouse; ducks, geese, rails, woodcock.

CONNECTICUT: About 35,000 hunters. Gray squirrel, rabbit, raccoon; pheasant (male), bobwhite (local), ruffed grouse (rare); ducks, geese, woodcock.

NEW YORK: About 590,000 hunters. Deer, bear (both local), rabbits, squirrel; pheasant, ruffed grouse, quail (local); ducks, geese, rails, woodcock.

NEW JERSEY: 129,000 hunters. Deer (local), rabbit, squirrel, raccoon; pheasant, ruffed grouse (rare, local), turkey (rare), Hungarian partridge; ducks, geese, rails, woodcock.

PENNSYLVANIA: 660,000 hunters. Bear, deer, rabbit, gray fox, and red squirrels; pheasant, ruffed grouse, bobwhite, turkey; ducks, geese, rails, woodcock.

DELAWARE: About 15,000 hunters. Rabbit, squirrel, raccoon, opossum; bobwhite; ducks, geese, mourning dove, woodcock.

MARYLAND: About 77,000 hunters. Deer, rabbit, squirrel; ruffed grouse, pheasant, bobwhite, turkey; ducks, geese, rails.

VIRGINIA: About 164,000 hunters. Deer, bear (both local), raccoon, opossum, rabbits (sometimes imported), woodchuck (no limit); pheasant, ruffed grouse (rare, local), bobwhite (local); ducks, geese, rail (local), woodcock.

WEST VIRGINIA: About 152,000 hunters. Deer, rabbit, squirrel; ruffed grouse, bobwhite, turkey (all local).

NORTH CAROLINA: About 153,000 hunters. Bear, deer (both local), raccoon, opossum, rabbit, gray squirrel, Russian boar; ruffed grouse (rare), bobwhite, turkey (local); ducks, geese, rails, mourning dove.

SOUTH CAROLINA: About 95,000 hunters. Deer, raccoon, opossum, rabbit, squirrel; bobwhite, turkey; ducks, geese, rails, woodcock.

GEORGIA: About 79,000 hunters. Deer, bear, squirrel (local), rabbit, opossum; turkey, bobwhite; ducks, geese, rails, mourning dove.

FLORIDA: About 57,000 hunters. Deer, bear (no limit), squirrel, opossum, rabbits; bobwhite, turkey; ducks, geese, rails, mourning dove.

ALABAMA: About 114,000 hunters. Deer, squirrel, opossum, raccoon, rabbit; bobwhite, turkey; ducks, geese, dove.

MISSISSIPPI: About 117,000 hunters. Bear, deer (both local), red and gray fox, rabbit, squirrel, opossum; pheasant, bobwhite, turkey; ducks, geese, rails, woodcock, mourning dove.

OHIO: 522,000 hunters. Rabbit, squirrel; pheasant, Hungarian partridge; ducks, geese, rails, woodcock.

KENTUCKY: About 96,000 hunters. Squirrel, rabbit; bobwhite; ducks, geese, woodcock.

TENNESSEE: About 84,000 hunters. Rabbit, squirrel, woodchuck (no limit), opossum; ruffed grouse (local), bobwhite; ducks, geese, rails, mourning dove.

MICHIGAN: About 712,000 hunters. Bear (local), deer (local), rabbit, squirrel, raccoon; pheasant, ruffed grouse, prairie chicken (local), sharptailed grouse (local); ducks, geese, rails, woodcock.

MINNESOTA: About 246,000 hunters. Bear, deer, squirrel, rabbit; pheasant, ruffed grouse, prairie chicken, sharptailed grouse, Hungarian partridge, bobwhite (all local); ducks, geese, rails, woodcock.

WISCONSIN: About 294,000 hunters. Bear, deer, rabbit, all kinds of squirrel; pheasant, Hungarian partridge; ducks, geese, rails, woodcock.

ILLINOIS: About 325,000 hunters. Rabbit, squirrel; pheasant (85,000 liberated), bobwhite (45,000 liberated); ducks, geese, rails, dove.

INDIANA: 358,000 hunters. Rabbit, gray and fox squirrel, raccoon, opossum, woodchuck; pheasant, Hungarian partridge, bobwhite; ducks, geese, rails, woodcock.

NORTH DAKOTA: About 41,000 hunters. Deer, rabbit; pheasant, Hungarian partridge; ducks, geese, rails.

SOUTH DAKOTA: About 75,000 hunters. Deer, rabbit, squirrel; certain grouse; ducks, geese, rails.

IOWA: About 183,000 hunters. Rabbit, squirrel; pheasant, bobwhite; ducks, geese, rails, coot.

NEBRASKA: About 130,000 hunters. Rabbit, squirrel, raccoon, opossum; pheasant; ducks, geese, rails, mourning dove.

MISSOURI: About 195,000 hunters. Rabbit, squirrel, woodchuck, opossum, fox, raccoon; bobwhite (local); ducks, geese, rails, mourning dove.

KANSAS: About 84,000 hunters. Rabbit, squirrel; bobwhite (local); ducks, geese, rails, mourning dove.

OKLAHOMA: About 111,000 hunters. Deer, squirrel, rabbit; bobwhite; ducks, geese, rails, mourning dove.

ARKANSAS: About 54,000 hunters. Deer, squirrel, rabbit; ducks, geese, rails, woodcock, mourning dove.

LOUISIANA: About 96,000 hunters. Deer, bear, rabbit, squirrel, chipmunk; turkey, bobwhite; ducks, geese, rails, woodcock.

TEXAS: About 124,000 hunters. Deer, squirrel (both local); chachalaca (local), bobwhite (local); ducks, geese, rails, mourning and whitewinged dove (local).

MONTANA: About 132,000 hunters. Deer, elk, bear, mountain goat (all local); ruffed and blue grouse (local); ducks, geese, rails.

IDAHO: About 104,000 hunters. Elk, deer, mountain goat, bear (all local); native and bobwhite quail (local), blue, ruffed and sharptailed grouse (local), pheasant, Hungarian partridge (local); ducks, geese, mourning dove.

WYOMING: About 27,000 hunters. Deer, moose, antelope (all local); pheasant, grouse (local).

COLORADO: About 160,000 hunters. Bear (1 male), deer (local), mountain lion and other predatory animals, cottontail rabbit; pheasant, native quail; ducks, geese, rails.

UTAH: About 75,000 hunters. Deer, elk (both local), bear, rabbit; upland gamebirds some years; ducks, geese, rails.

NEVADA: About 10,000 hunters. Antelope, deer (both local), rabbit; pheasant, mountain and valley quail, grouse (all local).

ARIZONA: About 34,000 hunters. Deer, bear; wild turkey, Gambel quail, mourning and whitewinged dove, band-tailed pigeon, waterfowl (few).

NEW MEXICO: About 28,000 hunters. Deer, bear, elk (all local), squirrel; quail, blue grouse (local); ducks, geese, mourning dove, band-tailed pigeon.

OREGON: About 112,000 hunters. Deer, elk, antelope (all local); pheasant (local), Hungarian partridge (local), native quail, blue grouse (local); ducks, geese, mourning dove, band-tailed pigeon.

WASHINGTON: About 215,000 hunters. Deer, elk, bear (all local), rabbit, squirrel; blue grouse (local), pheasant, Hungarian partridge (both local), quail (local); ducks, geese, rails, band-tailed pigeon.

CALIFORNIA: About 270,000 hunters. Deer, rabbit, black bear; quail, pheasant; ducks, geese, rails, mourning dove, band-tailed pigeon.

About Glaciers

Every once in a while teachers handling examination papers have a surprise. Such a one came to John H. Chase of Youngstown College, Youngstown, Ohio, when the grind of grading final examination papers produced the following estimate, by student Guy Scheatz, of "Glaciers":

The humor of a glacier is of the slow type

but it plays its joke in the long run. It twists streams about in their courses, builds ephemeral lakes, kidnaps huge boulders from their mother strata and leaves them friendless and alone in a strange land; it piles ridges of rocks in lateral moraines as it moves along to keep its sides from splitting with laughter; it tears itself apart as it moves over a cliff; but unlike Humpty-Dumpty, it puts itself together again and goes merrily on its way. It has the daintiest of blue pools on top that apparently have no bottom, and from its end a stream gushes out of a cold blue cave with water milk-white from eroded rock particles. And when it dies it builds up lasting tombstones of kames, eskers and drumlins.

KINGBIRD HOUSEKEEPING

By LILLIAN S. LOVELAND

We know that many birds are good housekeepers and, after the young are hatched, keep the nest scrupulously clean by removing the droppings. But a pair of kingbirds that have a nest in the spruce tree in my side yard introduced a new variation on this practice. In the front yard, enclosed by a picket fence with the grass carefully mowed, flower borders on all sides and a handsome bird bath, I like to serve tea to my friends.

Now, what do those kingbird parents do, but use the bird bath as a depository for the nestlings' droppings! I have watched one or the other come there, probably four or five times an hour, perch on the side of the bath and drop the excrement into the water. Occasionally the bird will take a sip or two of water before flying away, but not often. I clean out the bath every day and estimate that each twenty-four hours about fifty of the droppings have accumulated. Is this a common practice among birds, I wonder? Personally I have never heard of it before.

A Hawk Study

Three years ago Stanton Grant Ernst of the John James Audubon Bird Refuge, Syracuse, New York, marked out for study a five-mile-square area of largely low, swampy land bordering the Oswego River in central New York. The section is dotted with small woodlots mainly supporting tall hardwoods with some hemlocks and pines. Small birds, rodents and other forms are relatively abundant there. Mr. Ernst's object, however, was a study of the red-shouldered hawk.

"In 1939 three nests were found in the area," writes Mr. Ernst. "The first nest was located in a small woodlot of about six acres, and was an unusual find because the nest had been built in a hemlock. This was unorthodox, as was the character of the pair of red-shoulders who occupied it. They greatly resembled pigeon hawks in the manner in which they defended their nest—often diving to within two or three feet of our heads and once snatching the hat from my head. This first nest contained three eggs; one infertile, one taken by an egg collector, and one hatched. The second nest was found only one half-mile away and was far more orthodox. It was located in a large beech, about 40 feet from the ground. The nest was typical of all the nests—a large bulky affair, possibly three feet in diameter, composed of sticks and twigs, and lined with wild grape-vine and green hemlock sprigs. It contained three dirty white eggs splotched with different shades of brown, just under the size of a chicken egg and rounder. The third nest was found within ninety feet of a great horned owl nest in a large beech. As far as could be learned through observation, the owls and the hawks lived in accord, for the owls raised a lusty pair of young, and the hawks two male and two female young. A study of the castings of both pairs of these birds of prey revealed that the diet of the owls and hawks did not greatly differ. Both were made up of rodents, for the most part red squirrels and large meadow mice with scatterings of small birds and reptiles. I should judge that those three pairs of hawks and their young accounted for about eighteen mice and rodents each day per family, plus numerous insects, crawfish, frogs and small snakes. The owls were slightly more destructive—listing an occasional rabbit, pheasant, or small bird on the menu. However, an abundance of all kinds of easily captured food lowered the depredations on these higher and more wary sources.

"In 1940, hawks on our little square were rare. There were only two nests, both were late, and both contained only two eggs. Perhaps this was due to an extremely hard winter and a late spring. Wildlife in the vicinity was depleted and scattered. The whole area lost its appeal, and interest and study centered around a pair of sparrow-hawks and two pairs of screech owls that came to the territory to nest for the first time. The sparrow-hawk nest was in a dead apple tree, only eight feet from the ground and ten feet from the well-traveled Phoenix to Syracuse highway. In spite of its accessibility and in spite of the numerous egg collectors in the vicinity, I managed to protect it and was rewarded one July morning by the sight of the six immatures on their trial flights. They spent the whole morning testing their pinions, and by that afternoon the region was deserted. After leaving the tree, I never once saw one return. The mature female was sighted the next morning, however, on her favorite perch above the nesting hole. Perhaps she had returned for a last look around.

"The year 1941 bids fair to be the finest year for the red-shouldered hawks on our plot. By April 20, we had discovered six nests and still had one pair on the area for which we could not account. Every woodlot on the five mile square had a red-shoulder nest, and every nest had eggs—six nests, six breeding pairs, 22 eggs. We also had a pair of great horned owls in each of two woods, several sparrow-hawks, and at least one marsh hawk. The section contains many rodents and game animals and birds.

"This little plot of ground illustrates that Nature can balance herself without any outside help. The territory has an overabundance of birds of prey due to ideal conditions. To balance this, Nature has fashioned conditions ideal for the propagation of food for these birds. Whereas the hawks and owls draw heavily on this source, the hawks themselves are faced by many natural enemies—disease, hunters, farmers who have yet to learn of the red-shoulders' beneficial qualities, and the so-called scientific egg hunters.

"The results of my study have thus far been very interesting—often startling to one who thought birds of prey on the way 'out'—and extremely soul-satisfying. I am looking forward this year to studying the relationships of these birds to one another, and to other birds of prey."

To Understand Your World Today

YOU MUST KNOW

THE PEOPLE WHO MAKE THE NEWS!

Now, WHO, An Entirely New Kind of Magazine, Brings You The Inside Stories of The PEOPLE Who Are Making Today's History. . . . People are the most fascinating subjects in the world! Know the people who make the news . . . and you will know the news. Know their lives, their personalities, their ambitions, their achievements and shortcomings, and you will understand why they do what they do . . . what makes them tick.

FREE!

The first 3 issues of WHO MAGAZINE will be sent to you absolutely FREE! Issues containing biographies of Churchill, Knudsen, the Ladies In Waiting In The White House, DeGaulle, and a host of others. Only a few sets are left—order NOW!

SEND NO MONEY!

Simply fill out the coupon below, mail it to us today, and we will send you the first three issues of WHO (April, May and June) with our compliments. Subscribe for the next five issues of WHO for $1.00 . . . and get the first three issues free. And you don't even need to send the dollar now—unless you prefer. FILL OUT THE COUPON BELOW TODAY.

SPECIAL INTRODUCTORY OFFER!

Mail This Coupon Now

Gerard Publishing Company, Dept. N
420 Lexington Avenue
New York City

Enclosed is $1.00 for which enter my subscription for the next five issues of WHO—and send me the first three issues free. ☐

Send me the first three issues of WHO free and enter my subscription for the next five issues. I agree to pay $1.00 upon receipt of bill, or notify you of my desire to cancel. ☐

NAME .....

STREET NO. .....

CITY ..... STATE .....

TO THE EDITOR

John Doe Looks at Forestry

DEAR SIR:

Your editorial on forestry in your October, 1941, issue moves me to make certain observations. I have kicked around over these United States a good deal, and I have seen a lot of the forest lands that the Government owns—lands held for all the rest of us—keeping the fires out and making a place where a lot of folks can go out and camp under the trees, do a lot of fishing and shooting, and have a fine vacation. There is no better place than the woods, but I wish more people would stop and think about them a little bit.

I like to think about the United States as it used to be when the private individual counted for a little bit more than he does today. I never owned any land in my life—as a matter of fact I never owned much of anything—but I always wished I could. I'd like to try to get a piece of land that had some woods on it, and I would like to try to make a living from it if I could.

There are some people in Washington who think that a cure for everything is to have the Government run everything. But after the Government has acquired a lot of forest land and put it aside in a big reservation, we, the people, as I see it, have just that much less land that we could own ourselves. I hear it said that owners of our forest lands are cutting the trees down too fast; that lumber companies are exploiting lands and leaving desolation behind. Conservationists say that there should be a law against that. There should be a law, but I don't think that the future generations would thank us if we let the Government get to be the owner of all the good land. I don't hear anything about the Government taking over all the good farm land. It seems to have a different idea about the farmer; uses a lot of tax money to help him out; pays him for crops he does not raise.

I wonder why Uncle Sam doesn't think the same way about the man who owns forest lands. I don't believe that the Government is any better operator, or can take any better care of the forest resources of the country, than private individuals if the private individuals could get the right help. I am opposed to irresponsibility of both private and public ownership, but of the two I am convinced that the latter is the worst.

In going around the country I have seen a lot of good timber belonging to Uncle Sam that has grown old and too thick. A little cutting would be mighty sensible. Uncle Sam is sometimes pretty indifferent to economics. Maybe he thinks that hogging up a lot of forest lands of this country into big Government reservations is good politics, and I am for less politics. I am for the private citizen. I believe that private individuals and lumber companies that own forest lands are vitally concerned in protecting it. Any one would be a fool not to protect that which belongs to him, but you can't expect him to do all the things you would like him to do at a financial loss. I think the joke is on the people who put the blame on the private land owner for not doing the right thing under impossible conditions, and who are perfectly happy to see his title pass to Uncle Sam, or one of the States, which sometimes continue to do all the bad things plus a few more at a far greater cost. I mean we all must pay a heap more taxes when privately-owned land is taken out of circulation and pays no taxes. There is a human side to this forestry business. There are a lot of people who used to get some sort of a living out of the land they owned before it went over to the Government, and now they are on relief. In some cases they received some money for their property, and spent it.

The only good the public gets out of it, as far as I can see, is that there is more room for people to go camping and fishing without trespassing on anyone except Uncle Sam. This business of forest land getting into public ownership is a drift toward State Socialism, or Collectivism, or whatever you want to call it. Public ownership is sort of irresponsible except to the clique that happens to be running the show, unless there are enough responsible foresters, and people who can see where our public forest policies are heading and are willing to buck the tide. Our children are going to point out to us that the foresters and conservationists contributed an awful lot to changing our whole order of things and doing away with the private individual. I am for the conservationist, I believe we need more forestry—the kind of forestry that works for the best for all the people.

I think that it is fine to have our State and National Forests, but I am still for the private owner. People should be just as interested in privately-owned forest land as in nationally-owned forest land. I think it is up to the States and Uncle Sam to give fire protection to both, and if he must pass some laws let it be legislation that will help the private owner.

If forestry is as fine a thing as I am sure it is, we must be willing to pay for it. By that I mean that we must be willing to pay enough for the produce of the forests so that the private ownership of land is not on the road to bankruptcy, and so that the fellow who operates on a sustained yield basis, as the professionals say, can make a living without cutting it all down and leaving this much talked-of desolation behind him. Impoverished land certainly breeds impoverished people.

Let us fight to preserve the rights of the private citizen as a forest owner, and let us get the politicians to help him if he will practice real forestry.

JOHN DOE

New York City

Counterclockwise Snail

For many years Allyn G. Smith, research associate at the California Academy of Sciences in San Francisco, has been hunting for a snail whose spiral winds in the opposite direction from the usual. He has enlisted many friends who have been examining snails here and there in search of such an original snail. The search is now over because Mr. Royal Stewart of Berkeley found one in his garden. It is a common garden snail, *Helix aspersa,* but there is nothing common about its spiral. It is counterclockwise. This distinguished snail is now alive and doing nicely in an exhibit case at the Academy in Golden Gate Park.

LOST—A FRIEND

By KINSMAN E. CRUMB

A little friend of ours was killed yesterday—by someone's prowling cat.

This picture of her was taken only three days before when she had come to her feeding box in our front yard after sunflower seeds. Her nest was just across the street in a rubber tree. Three baby cardinals filled that nest right up to the top. Not much more than a week old, those were the hungriest baby cardinals you ever saw.

Their father and mother were looking forward to the day when they would bring those youngsters around and show them where they always could find lots of sunflower seeds. And, later on, perhaps the babies would have their pictures taken, too.

But this mother cardinal and two of her babies were killed. Her nest was torn to pieces, and when the baby birds fell to the ground, only one barely managed to drag itself to a place of safety. He may not live very long, but as long as his father is able to look after him he will get the very best of care.

Albino Robin

"Snowball" was the obvious name given to a pure white robin that appeared near Ithaca, New York, last summer, writes Alma H. P. Parsons in sending in the picture above. The bird was able to fly well when first seen, and was startling to observe. It became so tame that it would perch on a finger and eat worms, although most albinos, seemingly realizing the danger of their color, are notably timid. Although apparently cared for by both parents, the bird survived only a week after Mrs. Parsons saw it, seeming to lack the strength to carry on.

NATURE on PARADE

An album of more than one thousand of the finest Nature Photographs ever taken

Only **$5.00** *postpaid*

A beautiful book, size 9 x 12, 388 pages, bound in dark green imitation leather, Spanish grain, soft padded cover, stamped in gold leaf.

Since NATURE MAGAZINE made its bow in January, 1923, thousands of Nature pictures have been reproduced on its pages. These constitute the most remarkable pictorial parade of Nature ever published. The editors of NATURE MAGAZINE have reached out to gather together the best in Nature pictorial features, presenting them through the graphic process of rotogravure. More than one thousand outstanding Nature pictures are presented, with descriptive story relating to them. They unfold the camera's record of the life history of birds, mammals, or insects; or they represent typical flowers, trees, and other Nature forms of a certain region. A book of surpassing beauty and constant interest.

The edition is limited to one thousand numbered copies

Mail your order today

American Nature Association
1214 Sixteenth St., N. W., Washington, D. C.

Enclosed find $..... for ..... numbered copies of NATURE ON PARADE.

Name.....

St. & No.....

City & State .....

SQUIRREL MOVES

By CHARLOTTE E. FULLER

About the middle of August an old decayed tree on the grounds of the Presbyterian Orphanage at Anchorage, Kentucky, had to be cut down. As it fell the home of a flying squirrel was broken up. Eight baby squirrels were scattered on the ground. The little mother was frantic. Some of the children of the Orphanage saw the tree fall and began to pick up the baby squirrels; whereupon the mother squirrel, trying to retrieve her family, dropped down among the children and alighted on the head of one of the boys who had a baby squirrel in his hand. This frightened the children and they dropped the babies.

About this time one of the house mothers appeared on the scene and suggested to the children that they put the little squirrels all together at the foot of a nearby tree. This they did and then stood at a little distance to watch. The mother squirrel located a new home in another tree about thirty or thirty-five feet from the tree at the foot of which the babies lay. She then began to carry them one by one in her mouth, as a cat carries her kittens, to the new home. She would pick up one, run up the trunk of tree number one to a high point, spring through the air, alighting at a low point on tree number two, on up tree number two to her new home, deposit the little one, spring from this high point in tree number two through the air, landing on the trunk of tree number one near the foot, down to the ground, pick up another baby and proceed as before. She repeated this procedure until all eight babies were in their new home.

We had wondered if she would know when she had moved them all. But she came back a ninth time and nosed around the ground to see if any were left. She worked away until her task was finished, regardless of the fact that about thirty-five children and grown people stood by watching.

A.O.U. Meeting

At the Fifty-ninth Annual Meeting of the American Ornithologists' Union held in Denver, Colorado, Dr. James P. Chapin of New York was elected president for the ensuing year. The meeting brought together 238 ornithologists who listened to forty-five scientific papers and enjoyed many color slides and films of bird life. The Brewster Memorial Medal was awarded to the late Donald R. Dickey and to Adriaan J. Van Rossem of the California Institute of Technology for their book on the birds of Salvador.

Poems

Listening. By Frances Hunt Pray. Roscoe, California. Published by the Author. 48 pages. $1.00.

This is a collection, if we count correctly, of 114 poems by the author, most of them Nature poems that reflect a sentient response to and appreciation of the outdoors. An excellent example is entitled "Straying Snow", which goes:

On wings of crystal lace
The straying snow,
Is rain's bewildered soul
Made visible.

A FAMILY HOTEL IN ATLANTIC CITY

For years the Runnymede has catered to a family clientele and children are especially welcome.

Located on beautiful Park Place, it is free from traffic with no streets to cross and is but a few steps to a selected bathing beach.

The environment at the Runnymede is homelike. Ample lobbies and parlors with open and enclosed sun decks atop. Large cheerful sleeping rooms, comfortable beds, delicious foods and most courteous service at all times.

No Liquor Sold—Restricted Clientele
SPECIAL RATES TO CHILDREN

The Runnymede

Everett J. Higbee, Manager

REMEMBER NOVEMBER at **P. M.**

The air is dry, crisp, and snappy . . . just right . . . just heavenly right for riding, tramping, golf and outdoor parties . . . Table tennis and other games indoors. Library and crackling log fires. Fresh food and plenty of it. Come, and bring the family during November.

POCONO MANOR

HERMAN V. YEAGER, General Manager
POCONO MANOR, PA.

GLASS EYES **Sensational New Eyes**

AMERICAN MADE, Enameled, Beautiful, LOW-COST. Big news for Taxidermists, as European stock is exhausted. New Catalog 114, FREE. Write for Free Samples and Special Offer. Complete line of supplies. RUSH POSTAL.

ELWOOD SUPPLY CO. Dept. 61 Omaha, Nebr.

GRAY FOXES—ALL AMERICANS

(Continued from page 495)

Type from Marlboro, New Hampshire.
Larger and darker colored than typical *cinereoargenteus;* dark gray above, rich ferruginous on sides and neck. Weight 9 to 13 lbs. Range, New Hampshire to Ohio, in Transition Zone.

Wisconsin Gray Fox. Urocyon c. ocythous Bangs, 1899.
Type from Platteville, Wisconsin.
Size large; colors dull gray and dusky. Adult female, 1024; 386; 136 mm. Weight 11¾ lbs. Range, Illinois to Minnesota.

Florida Gray Fox. Urocyon c. floridanus Rhoads, 1895.
Type from Tarpon Springs, Florida.
Smaller than the Eastern gray fox; lighter gray above and more yellowish on belly. Measurements, 975; 355; 142. Range, Florida and eastern Georgia to eastern Texas, in Lower Austral Zone.

Arizona Gray Fox. Urocyon c. scottii Mearns, 1891.
Type from Oracle, Pinal Co., Arizona.
Large ears and long tail; light gray above and yellowish below, more white on throat and belly. Adult male, 1012; 420; 141 mm. Weight about 12 lbs. Range, West Texas to Arizona, California and Nevada to central Mexico.

California Gray Fox. Urocyon c. californicus Mearns, 1897.
Type from San Jacinto Mountains (8000 feet), California.
Similar to Arizona gray fox, but darker gray and more rusty brown. Range, west slope of San Jacinto and Sierra Nevada Mountains to the Pacific, in Upper Sonoran Zone.

Shasta Gray Fox. Urocyon c. townsendi Merriam, 1899.
Type from Baird, Shasta Co., California.
Slightly larger and richer colored than *californicus.* Range, northern California and Oregon, in Upper Sonoran Zone.

Sequoia Gray Fox. Urocyon c. sequoiensis Dixon, 1910.
Type from Lagunitas, Marin Co., California.
Size between *californicus* and *townsendi;* darker and more richly colored than either; adult male, 987; 395; 135 mm. Range, humid Coast strip from Monterey Bay to southwestern Oregon.

Peninsula Gray Fox. Urocyon c. peninsularis Huey, 1928.
Type from San Ignacio, Lower California, Mexico.
Smaller and grayer than *californicus* or *scottii;* type, 892; 375; 121 mm. Range, southern half of lower California in Lower Sonoran Zone.

Colima Gray Fox. Urocyon c. colimensis Goldman, 1938.
Type from Colima, Colima, Mexico.
Slightly smaller and darker colored than *scottii.* Adult male, 960; 410; 138 mm. Western Mexico from Sinaloa to Tehuantepec, mainly in Tropical Zone.

Yucatan Gray Fox. Urocyon c. fraterculus Elliot, 1896.
Type from San Filipe, Yucatan, Mexico.
Small and richly colored. Type, 750; 290; 95 mm. Range, Peninsula of Yucatan, on dry eastern slope of mountains.

Orizaba Gray Fox. Urocyon c. orinomus Goldman, 1938.
Type from Orizaba, Vera Cruz, Mexico.
Smaller than *scottii* and much darker colored; larger than *fraterculus.* Adult female, 935; 358; 128 mm. Eastern Mexico from San Luis Potosi to Oaxaca, in Humid Tropical Zone.

Guatemala Gray Fox. Urocyon c. guatemalae Miller, 1899.
Type from Nenton, Guatemala.
Size small but colors dark and rich; measurements, 830; 327; 128 mm. Range, dry parts of Guatemala.

Panama Gray Fox. Urocyon c. furvus Allen and Barbour, 1923.
Type from Balboa, Canal Zone, Panama.
Small and very dark colored, Costa Rica to Colombia, in Humid Tropical Zone.

Venezuela Gray Fox. Urocyon c. venezuaelae Allen, 1911.
Type from Tocuyo, Venezuela, South America.
Size small; ears large, chin and feet dark. Range, northern Colombia and Venezuela.

San Miguel Gray Fox. Urocyon littoralis littoralis (Baird). 1857.
Type from San Miguel Island, Santa Barbara group, California.
Colors much as in *californicus,* but size much smaller; about 725; 250; 110 mm. Weight 4 to 4½ lbs.

Santa Cruz Island Fox. Urocyon littoralis santacruzae Merriam. 1903.
Type from Santa Cruz Island, Santa Barbara group, Calif. Similar to *littoralis,* but more fulvous; dusky spot at base of whiskers larger and darker. Measurements, 708; 266; 109 mm.

Santa Rosa Gray Fox. Urocyon l. santarosae Grinnell and Linsdale, 1930.
Type from Santa Rosa Island, Santa Barbara group, California.
In color nearest to *U. l. santacruzae,* tail longer than in *U. l. littoralis,* adult male, 741; 245; 115 mm.

Santa Catalina Gray Fox. Urocyon l. catalinae Merriam, 1903.
Type from Santa Catalina Island, California.
Tail longer than in *U. littoralis,* throat whiter, less white below. Adult male, 795; 298; 112 mm. Weight of male 5 lbs., of female 4½ lbs.

San Clemente Gray Fox. Urocyon l. clementae Merriam, 1903.
Type from San Clemente Island, California.
Similar to *littoralis,* but more black at base of whiskers, throat whiter, and more white on feet and thighs. Measurements, 688; 250; 100 (dry).

San Nicholas Island Fox. Urocyon l. dickeyi Grinnell & Linsdale, 1930.
Type from San Nicholas Island, California.
Like *clementae,* darker gray on back and less rufous on side of head. Adult male, 730; 270; 111 mm. Known only from San Nicholas Island.

WORTHWHILE HOBBY

By FLORA MCINTYRE

The hobby of Philip Stanton, a college boy, whose home is in Long Beach, California, must bring him some of the deeper satisfactions of life. He puts on hip boots and rescues wild ducks that have mistaken the pools of crude oil in the oil fields near Long Beach for water. Such ducks, if not rescued, are doomed to a slow and miserable death. But Philip, whenever he finds one, lifts the helpless, be-smeared creature out of the oil and carries it home. There he first scrapes off all the oil he can. Then he washes the poor, bewildered duck in many baths of corn oil, which is the only thing he has found that will dissolve the crude petroleum without injuring the birds. Next comes a thorough sousing and scrubbing in warm soap suds. The duck, now free of oil, is wiped off and wrapped in a bath towel. If the weather is cold, it is put under the kitchen stove to dry; if it is warm the patient is placed outdoors in a deep container like a small barrel until it is dry. The final step is confinement in a "recuperating pen" where the birds stay until the natural oil has returned to their feathers and they are able to swim and fly and take care of themselves. Philip then releases them.

A FIGHT IS WON

By I. A. OGDEN

Much amusement was given us by a belligerent Texas red bird whose combative spirit was directed only at himself. He would fight his own reflection in the garage window near his nest, doing so by the hour. However, he seemed to resent himself most when he found himself in the gazing globe and declared war. Finally the cardinal seemed to have won the fight and would perch contentedly on the globe, where we snapped his picture.

SHEETS FOR THRUSHES

By MAY SIBLEY LEE

One of my granddaughter's bibs needed bleaching so I wet it and laid it on the grass and went to pick some flowers. When I came back the bib was gone and my cook called to me to say that she had seen a bird take it up into an oak tree. We went to the tree and there was the bib on a low branch, being so large that the bird could not take it further. It was unharmed. Mary suggested that "the poor thing wanted some sheets" for her housekeeping, so she tore up some cloth into pieces about one inch by six. The thrushes took them all. When a high wind in November blew the nest down we found the strips nicely woven around it.

NATURE IN PRINT

As a convenience to readers the books reviewed in the pages of Nature Magazine may be ordered through the book department of the American Nature Association, 1214 16th St., Washington, D. C.

(Continued from page 483)

Rambles in Europe, New College Geography, Exploring Geography, Mountain Geography, and *Geography in Human Destiny,* he says that he intended to entitle his biography "The Education of An Unimportant Man." A better choice indeed is *The Incurable Romantic,* a title that can mislead no one and should entice a large number to read this infectiously enthusiastic, straightforward, and playfully naïve account of a life that has included World War service, much travel, many human associations, and a most romantic marriage. Throughout the book Roderick Peattie expounds and exemplifies a romantic philosophy of life that should insure a welcome, and his discussions of his theories of teaching geography make it plain that it must be a privilege to sit in his classes.

No artist in letters like his brother, Roderick Peattie has written an autobiography on the conventional order and in a style that is a stream of engaging conversation, including, of course, a chapter on his father and another on his mother and a most affecting account of his mother's last days. In a sense *The Incurable Romantic* is first-class collateral reading to *The Road of a Naturalist,* for in it one can see more explicitly, if he wishes to, the character of the environment that produced this day's outstanding Nature writer, yet this observation indicates an added value to the work and not a disparaging comparison. There is no more comparison between the two books than there could be between an extraverted geographer and an introspective Prophet of Nature, but it is indeed interesting to read successively the autobiographies of two men who have both labored in the fields of Nature, grown up in the same home, had similar good fortune in romance, and who both know how best to tell their own stories.

Garden Authorities Speak

Gardening with the Experts. By Richardson Wright, Henry E. Downer, Robert S. Lemmon, Rosetta E. Clarkson, J. Horace McFarland, Montague Free, Dorothy Biddle, Dorothea Blom, Cynthia Westcott, Howard B. Sprague, Donald Wyman and Sarah V. Coombs. New York. The Macmillan Company. 1941. 239 pages. $2.50.

To this book each of the twelve collaborators contributes a chapter on the field of their special interest. The result is a book that will delight every garden lover seeking advice and information that ranges from the practical growing of plants to the use of color in the garden and the home.

Natural History's Part

Natural History and the American Mind. By William Martin Smallwood and Mabel Sarah Coon Smallwood. New York. Columbia University Press. 1941. 445 pages with illustrations. $4.25.

This is a significant and extremely interesting book, one that will be absorbing and enlightening to anyone interested in the intellectual history of America from whatever viewpoint. The authors have given us a provocative study of the vital part played in the development of American culture up to 1850 by the early naturalists and specialists who pioneered in the study of the natural sciences in this new and rich country. Their work was primarily that of exploration, discovery, classification and verification. After them, from the middle of the Nineteenth Century on, came the scientists who applied the deductions and developed the myriad uses of these natural resources. Starting with the early students and writers, such as Oviedo, Thevet and Hariot, the authors weigh the contributions of the many naturalists who followed. Some of these were obscure; some were, like Audubon, to attain increasing fame. Evaluating their respective gifts to present-day culture was no mean task and it is one that the Smallwoods have performed with notable success.

Franklin's Experiments

Benjamin Franklin's Experiments. Edited, with a critical and historical introduction, by I. Bernard Cohen. Cambridge. The Harvard University Press. 453 pages. $4.00.

The world will ever marvel at the many facets to the mind and abilities of the great Franklin. In Europe his fame as a scientist preceded his eminence as a figure in international politics. His book on electricity won him many scientific honors, but that work has long been difficult to obtain and has been only fragmentarily reprinted. Now Mr. Cohen, with an appropriate critical introduction to aid the layman, gives us a capable, valuable and fascinating edition of this significant early work.

Great Lakes Fishes

Guide to the Fishes of the Great Lakes and Tributary Waters. By Carl L. Hubbs and Karl F. Lagler. Bloomfield Hills, Michigan. The Cranbrook Institute of Science. 1941. 100 pages, plus plates. Paper, $.50; Cloth, $1.00.

The title of this book is thoroughly descriptive of its contents. It presents data on the methods of counting and measuring, a key to the families, keys and distributional synopses and a list of references. It is a valuable contribution to regional ichthyological literature.

Orchid Collection

Nearly 10,000 orchid plants appraised at more than $75,000 have been presented to the New York Botanical Garden. They come from the greenhouse of the late John A. Forster in Hackensack, New Jersey and were a gift from Mrs. Forster. The majority of the plants are varieties of hybrid cattleyas, popularly known as "florists' " orchids. Special displays will be shown during the fall and winter bloomings.

CLASSIFIED

BOOKS ON FORESTRY

FOREST FACTS FOR SCHOOLS

336 pages, 34 illustrations, cloth bound. Book for pupils in Grades 5 to 12. Exercises and new-type tests follow each division of the text matter. 80c

FORESTS AND MANKIND

250 pages, 66 cuts and illustrations, cloth bound. Convincing knowledge of the importance of the forests in their historical, social and economic relation to mankind. $3.00

TREES AS GOOD CITIZENS

268 pages, 16 full color plates, 125 other illustrations, cloth bound. This book tells the whole story of the shade tree. $2.00

NATURE BOOK DISTRIBUTORS
1214 16th Street, Washington, D. C.

BUTTERFLIES

BUTTERFLIES, Perfect and Named. #1. from India all different 10 for $1. #2. "Africa 10 for $1. #3. from S. America 15 for $1, including a blue Morpho. #4. Blue Morphos, all different 3 for $1. #5. Living Cocoons 15 for $1. of Large American Moths, assorted, post Paid. **Butterfly World Supply House, 297 East 98th Street, Brooklyn, N. Y.**

NATURE SUPPLIES—POSTPAID—(1) 20 Living Cocoons (Giant Moths, including Luna and Io), $1.00; (2) Holland's Butterfly Book $9.00; (3) Moth Book $4.50; (4) Lutz' Field Book of Insects $3.15; Also Riker Mounts, Iso-Propyl Alcohol, Praying Mantis Eggs, Silkworm Eggs, etc. New Free List
NATURE'S HOUSE **PLATTEVILLE, WIS.**

FILMS DEVELOPED

IMMEDIATE SERVICE—Pictures returned same day order is received! Sixteen guaranteed Deckled-Edge Velox prints from roll, 25c. One colored or two plain enlargements plus 8 Deckled-Edge Velox Prints, 25c. Special! Coupon for FREE 8 x 10 Enlargement given with each 25c order. Write for FREE mailers, details other big bargains. **AMERICAN STUDIOS, Dept. 92, LaCrosse, Wis.**

INDIAN CURIOS

25 **Genuine Indian** arrowheads. $1.00. Catalog. **GEO. HOLDER, Glenwood, Ark.**

PHOTOGRAPHY

"HOW TO MAKE GOOD PICTURES". Twenty-third edition now available. Up to date in every respect with details of Kodachrome and Infra-Red photography; new chapters include Stunt Photography, Flower Photography, Night Photography, Indoor Portraiture, Composition and many more new features. At 50c this book still remains at the head of our "must" list. **NATURE BOOK DISTRIBUTORS, 1214 16th Street, Washington, D. C.**

SCIENTIFIC

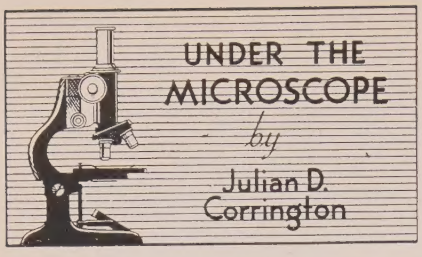
TELESCOPES, Microscopes, Binoculars; bargain catalog free. **Brownscope Company, 5 West 27th Street, New York.**

SEA SHELLS

ASSORTMENTS land or marine shells; 12 in partitioned box $1.00; list of more expensive assortments on request. **Mrs. F. K. Hadley, 1572 Eastern Ave., Malden, Mass.**

WILD FLOWERS

IN COLORS—60 post cards, 25c doz.; 64 2 x 3 in. stickers 55c; book of 365, $3.95; 50 lantern slides & lecture rented 1 day $3.75 & postage. Books, slides or photos (7000), movie films. Membership & magazine $1.50 a year; Junior Chapters of 25 or more 10c per member. **Wild Flower Preservation Society, 3740 Oliver St., Washington, D. C.**

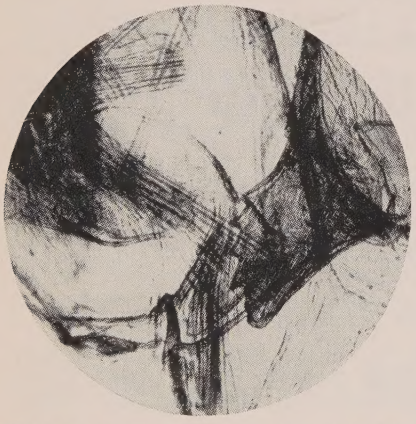


Insect Musicians

Those insects that have the most highly developed hearing organs are also the greatest sound producers. Locusts, grasshoppers and crickets fiddle away the long evenings of late summer and autumn, cicadas make the hot days fairly vibrate with their loud and rasping notes, while many flies and bees hum or drone as they pass by on their busy quests.

The vast majority of insects are silent, at least as far as human ears can detect, and it is fortunate for us that this is so, otherwise the summertime would drive mankind to distraction if all the countless billions of this Lilliputian clan could sound off as does the cicada or the tree cricket.

What sort of noise-producing mechanisms are present among insects? The microscope steps in here to explain the fascinating details of construction of the several kinds of devices, and slide mounts to show these are easily prepared.

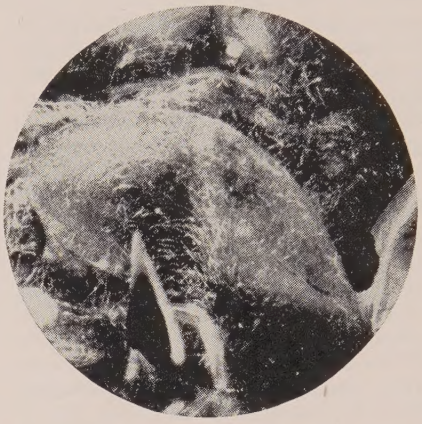


STRIDULATING LEG, A STUBBY MODIFIED LEG, WITH SHARP POINTS, AT RIGHT. WASHBOARD OF LEG AHEAD AT LEFT AND ABOVE

Practically all invertebrates other than insects are silent, and also most fish and salamanders. With frogs, among vertebrates, the chorus begins, and the bellowing of alligators in southern swamps, the charming musical performance of birds, and the barking, roaring and lowing of most mammals form a series that culminates in the human rendition of such a lovely aria as the Prologue from I Pagliacci.

But with all of these vertebrates sound production is vocal, whereas with insects it is never so. The two main types are a rasping or fiddling, technically known as stridulating, as in the grasshopper group, and a muscular vibrating, as with the cicada. With few exceptions, only the males produce these sounds.

The locusts or short-horned grasshoppers (antennae shorter than body) rub the outer surface of the forewing against the inner face of the hind femur on the leg of the same side of the body, while the crickets and long-horned grasshoppers (antennae longer than body) work the two wings of a side against one another. To see the original fiddle, remove a hind leg from the male of any of the commoner species of locusts, such as the little red-legged locust found in our fields and meadows, and place on a blank slide, inner side up, for examination by moderately high power (50 to 100X). Along the middle of the femur, the largest and



THE SOUND-PRODUCING ORGAN OF THE CRICKET

fattest joint, runs a row of very fine pegs, from 80 to 90 in number. These collectively constitute the bow, while the hardened veins on the outer surface of the forewing act as strings. It is amazing to think of such loud noises coming from so tiny an instrument.

Now secure a male of the katydid, or other large example of the long-horned group, and remove the two forewings, the left one of which overlaps the right. Near the base of the inner angle (next to body) of the left forewing is the stridulating organ, a more or less rounded zone bordered by a curved vein. This space is crossed by another vein that bears a row of fine, tooth-like projections, used to rasp against a smooth area of tightly-stretched membrane on the right forewing.

In crickets the right forewing overlaps the left, just the reverse condition, and the stridulating apparatus is larger and double, each forewing bearing both a file and a scraper. When crickets sing, the two forewings are elevated to the horizontal position and worked back and forth in that plane, the file of one wing rasping the scraper of the other, setting both wings vibrating. So penetrating is the noise thus produced that in some species it is said to be audible a mile away!

The Chinese have for centuries cultured crickets, which are highly prized for their powers of combat as well as song. Males are pitted against one another and an entire cult has grown up around this sport, while other fanciers maintain their captives in tiny cages, much as we do canaries, in order to enjoy their musical performances.

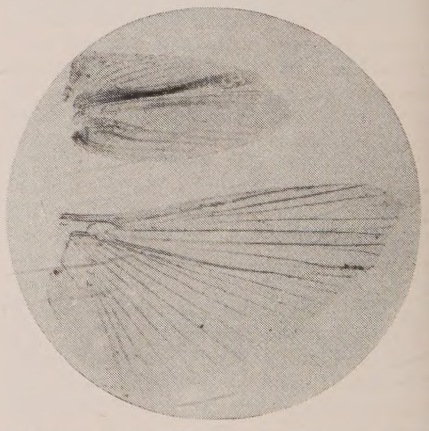
Stridulating organs occur in at least a few members of most all major insect groups. Among beetles, an excellent example is the larva or grub of *Passalus,* the common woodboring beetle abundant in rotten stumps and logs. Instead of the customary three pairs of well-developed legs there are only two that function as such, the third pair being reduced to very small stubs, consisting of the first two joints only. Either of these may be fiddled across an area of the first joint of the leg ahead, on which is a washboard of fine ridges. This action produces a prominent squeak, noticeable upon handling the grubs, and the structure makes an attractive slide mount.

The most powerful as well as complicated of all insect sound-producing organs, however, are found on male cicadas. These are the so-called "seventeen year locusts," one species of which is annual and may be collected for study each summer. Under the body, at the beginning of the abdomen and just in rear of the last leg on each side is a drum, exposed on some species, covered by a plate (operculum) on others. A drum contains two cavities and three membranes, the main one of which is worked in and out by a powerful muscle, beginning with moderate speed but increasing rapidly and steadily, the noise augmented by the other two membranes acting as sounding boards. In some regions of the earth, cicada choruses are truly deafening.

As to the purpose of insect noises, not much can be said since we are in danger of placing a human interpretation upon them. Undoubtedly in some cases the sounds call the sexes together for mating, while in others they may serve perhaps as a means of communication, warning of danger or permitting recognition between members of the same species or nest. But in most instances, as with the song of birds, the true explanation is either not yet known or else these sounds represent a sheer letting-off of energy or express a sense of well-being. All's well with the world, so why not say it with music?

The Cellosolve Technique

Within the past ten years Industry has begun to pay some of the interest owed on



WINGS OF CRICKET. AT LOWER LEFT CORNER OF UPPER WING IS THE FILE AND SCRAPER. LOWER WING IS FOR FLIGHT ONLY

her enormous debt to the microscope. As many of our readers are aware, the microscope has become the monarch of all instruments used in basic industries, determining purity and proportions of content, particle size, and completeness of mixing, as well as detecting flaws, defective portions or adulterants in textiles, paper, rubber, paints, ceramics, steel, oil and machines, to mention a few.

An important line of research in modern industrial chemistry concerns solvents—reagents to be used as vehicles in making plastics, lacquers, cements and other products. Many new solvents have been tried and some

ave proved their worth. Among these are ertain ones that have been applied to micro-echnique and found to be remarkable for arious properties. By eliminating the time-onored series of alcohols in dehydrating issues, these new solvents injure the material ess, prevent excessive shrinking and harden-ng, avoid the difficulties of obtaining ethyl lcohol at a reasonable price, and generally ffect great savings in time and manipula-ions.

The first of these reagents was dioxan, re-orted in these columns in the February, 939, issue. This month attention is turned o cellosolve, technically described as ethylene lycol mono-ethyl ether, first reported as use-ul in microscopy by Frost, in England in 935. Many American workers have since aken up cellosolve and are enthusiastic over he method and its results.

In using this chemical, fix and wash the issue as usual, then blot it gently with ab-orbent paper, such as toweling, to remove he bulk of the water, and place it in a jar of ellosolve for one to two hours, depending n size and permeability of the object. Change o a fresh lot of cellosolve for a second one r two hours. A longer stay does no harm, llowing accommodation to various time chedules and the operator's convenience.

The material is now passed through xylene, wo changes, during fifteen to thirty minutes, nd thence to paraffin infiltration and imbed-ling. After sectioning and the affixing of ections to slides, the paraffin is removed by xylene as usual, then the sections go through wo jars of cellosolve, five minutes each, and nto water. Stain as desired (e.g., Delafield's ematoxylin), rinse, destain if necessary, and inse again. Again go through two jars of ellosolve, five minutes each, counterstain as referred (e.g., eosin) with the dye dissolved n cellosolve, clear in a mixture of equal arts of oil of cloves and oil of thyme, pass hrough xylene and mount in balsam.

The whole series of alcohols is thus avoided hroughout both preparation for imbedding s well as for mounting, greatly shortening he number of separate steps and consequently he time, as well as effecting an important aving in materials.

Cellosolve is manufactured by the Carbide nd Carbon Chemicals Corporation, 30 East 2d St., New York City, from whom it may be purchased in quantity. For the small mounts needed by the individual micros-copist, we have not yet been able to secure a variety of addresses, but do note that cello-solve is listed in the catalogs of the General Biological Supply House, Inc., 761-763 East 69th Place, Chicago, and the Hartman-Leddon Co., 6010 Haverford Ave., Philadelphia.

How to Mail Slides

Every so often we receive one or more slides for examination or as a gift from one of our readers, and because of the high mortality of such shipments, which usually arrive smashed all to pieces, we thought a brief note on packaging would not be amiss as a matter of general information.

Slides may be stacked one upon another, with cardboard squares as separators. Select board of a thickness at least equal to that of the cover glass and cut one-inch squares, placing one of these on each side of the cover of each slide. The stack is then tied tightly at each end with silk thread. If perfectly dry and hard, such slides may be wrapped next in tissue paper—otherwise use a blank slide as the uppermost one of the stack, to prevent the paper from coming in contact with unhardened balsam. Secure the tissue paper at each end of the stack with rubber bands or string, then wrap in crumpled newspaper, and finally pack one or more such stacks in a box along with plenty of newspaper on all sides. Choose a box of sufficient rigidity to resist rough handling in the mails.

We have received shipments packaged in this manner from foreign countries, with little or no breakage, because the man who sent them was careful and knew the hazards of such a journey and made ample allowances. On the whole, however, it is much better to use professional slide-mailing cases and boxes, obtainable from all of the apparatus supply houses. The simplest of these is a flat, grooved block of wood, a trifle larger than the 3 x 1 inch slide, made so that any number may be stacked, the grooves between any two fitting together with a space between for one slide. Wrap the slide in cotton or tissue paper and place between two of these blocks, which need only wrapping paper to provide for addressing, and will stand any amount of abuse.

Slotted boxes with lids are familiar as storage containers of slides in the laboratory, the customary capacity being twenty-five. It is not so generally known that such boxes are available to house two, three, six and twelve slides respectively, and these make the most satisfactory of all shipping containers. Large mailings are done often in hinged, cloth-covered boxes of one hundred capacity.

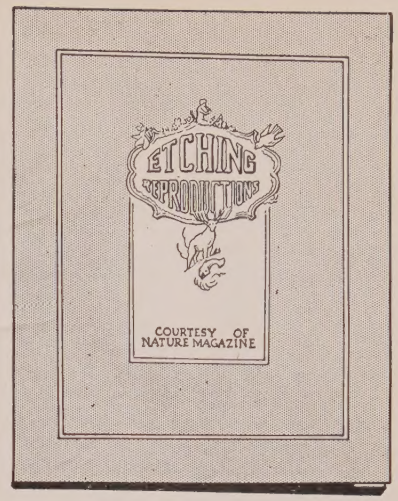
We have seen cardboard boxes of appropriate size fitted with corrugated paper or metal, the depressions of which were matched on opposite sides of the container and served as slots to keep the slides separated. If reinforced with paper or cotton plugs between each pair of slides, fitted on each side of the cover glasses, such homemade slide boxes serve very well.

Cotton liners are provided by supply houses and should always be used with all box-type containers. They are long strips of felted cotton accommodating to the width of the box and of a length so as to line the bottom, come up around one end after the slides are placed, thence folded back along the top, and finally tucked in at the opposite end. The slides are thus completely surrounded with cotton padding and held apart by slots, at the same time housed within sufficiently strong wooden boxes. If your slides have any value, give them their due by the small expense and care incident to this form of shipping container.

Plastic Cover Films

Have you had cover glass troubles? Microscopists are finding it increasingly difficult to buy this necessary commodity, the war having raised hob with importations. We have heard it said that the machine that cuts out round or square covers from sheets of exceedingly thin glass is an elaborate and costly device, and that while such a machine could be set up in America, it would hardly pay for itself. This is because a ten years' supply of covers could be cut out in a few months, and the machine would then lie idle for years!

Meanwhile relief has come from another quarter. Professor Hance, of Duquesne University, Pittsburgh, has been working with a form of plastic material suitable for use as cover films (one can hardly refer to these as "cover glasses" since they are not made of



50 cents a set, postage prepaid

Portfolios of Etching Reproductions

These make attractive and inexpensive Christmas Gifts

Eight Nature Etching Reproductions 9 x 12 inches in size, carefully selected from a large number of the best works of famous etchers of wild life, and inserted in an attractive portfolio.

Will Simmons . Polar Maternity
Diana Thorne . Making a Beseech
Richard E. Bishop . The Osprey
Charles Emile Heil . Chewinks
Winifred Austin . Pheasant Brood
L. R. Brightwell . Not Interested
Roland Clark . Gathering of the Clan
Carl Rungius . Lord of the Canyon

From the hands of famous etchers

50c a Set

while they last

Send your order today!

AMERICAN NATURE ASSOCIATION
1214 Sixteenth St., N.W., Washington, D. C.

glass) and has developed two types, which he calls "Histo-covers." Type A is for permanent mounts, cemented on, and is supplied with the appropriate cement; Type B is for water mounts only. Dr. Hance believes that these films are superior to glass and will eventually replace the older article. Anyone interested may write Professor Robert T. Hance, 1 Broadmoor Ave., 16, Pittsburgh, Pa.

We are also in receipt of samples of a similar article from the General Biological Supply House, Inc., 761-763 East 69th Pl., Chicago. The advantages, as outlined by this firm, include: clear and colorless, with a refractive index of 1.528 (for comparison, glass is 1.52 to 1.59 and balsam in xylene is 1.526), will not curl and are suited to either water or balsam mounts, unaffected by any of the commonly used reagents, available in any quantity at about one-quarter the cost of glass covers, as well as in large sheets for special purposes, and entirely of U. S. manufacture.

Trade Notes

All manufacturers of standard microscopes provide a booklet of instructions with each instrument. The 1941 edition of the Spencer Lens Company's manual is entitled *The Effective Use and Proper Care of the Microscope,* and is a great improvement over earlier booklets, particularly in that it goes much further and takes up advanced procedures. The several parts are titled elementary methods, preparation of materials, stereoscopic microscope, care of the eyes, care of the microscope, accessories for the microscope, advanced technique, visualization and special methods, recording observations, conclusion, and bibliography.

Consisting of sixty pages, with 47 illustrations, this work is, in fact, a highly condensed textbook. How to obtain Köhler illumination, use polarizing attachments or a camera lucida; an understanding of dark field and its uses, an aplanatic condenser, correction collar, refraction image, or resolution; these are but a few of the many topics considered by the author, Dr. Oscar Richards, who is Research Biologist for Spencer. Through the courtesy of this company, copies have been made available to readers of this department. To secure your booklet, send a three-cent stamp to Dr. Julian D. Corrington, Nature Magazine, 1214 Sixteenth St., N.W., Washington, D. C., and ask for Spencer, *Use of Microscope.*

Nobel Prizeman Sir Charles Sherrington, O. M., is one of the most distinguished scientists of our generation and in *Man On His Nature* reveals exceptional powers of authorship. This work has been widely acclaimed as one of the most important contributions to the history of man's speculation about himself and his own place in the universe. The contrast is made between the findings of a modern biologist and a scientist of the sixteenth century, when magic and astrology held sway, and when there were no chemistry and no microscopes.

Showing that there can no longer be any logical division into living and nonliving, and that there is no reason why biological processes should not ultimately be expressed in terms of atomic physics, Sir Charles points out that "Nature is not made less wonderful because her rule of working begins to be intelligible. If it be a question of wonder, rather the more wonderful," and he goes on from morphology to a fascinating consideration of the human mind and psyche. Evolutionary laws are found to be dismal indeed, with the inexorable might-makes-right dictum, but man now has the mind and the knowledge to alter some of these laws and make them work for his own betterment. "Under evolution the motto of the planet has been 'more life,' under man's leadership it should be 'better life.'"

Nor is the subject left hanging, with man in hopeless disillusionment over his own fate. Dr. Sherrington proposes workable solutions in the fields of science, sociology and religion. The reader will find many challenging statements; he will not agree with all, perhaps, but he will be stimulated. We were highly interested by this important volume and wish to pass on an unqualified recommendation. If you have any liking at all for scientific philosophy, don't miss this one! Pp. x, 413; plts. VII, figs. 5. The Macmillan Co., 60 Fifth Ave., New York City, $3.75.

Microscopists who have been taught how to use their instrument properly should get a kick out of some of the current advertisements. Models posing as scientists for photographic illustrations in which a microscope is shown in use regularly commit a number of fundamental errors. One we saw lately had the instrument backwards, with the tube toward the observer; another had the eye not in use all screwed up into a delicious squint; while in a third, the mirror was turned away from the light source and no object appeared upon the stage, which perhaps was just as well.

The fifth edition of a well-known textbook of zoology has made its appearance—the *Principles of Animal Biology,* by Shull, LaRue, and Ruthven, of the University of Michigan. Back in 1920, when this work was first issued, it was a pioneer in a new movement—to teach the principles of the science rather than, as theretofore, the systematic zoology of all main animal groups, from amoeba to man. Thus, such topics as the nervous mechanism, cellular organization, ecology and distribution are stressed as principles applying to all animals, with examples drawn freely from any of the groups.

This teaching device caught on with a great many who felt the need of a new and improved method, and the *Principles* has enjoyed wide popularity. In the fifth edition, conforming with present-day emphasis, the authors have placed greater stress on function and the mechanism of regulation; the account of the autonomic nervous system has been extended, and the problems of development rediscussed, while the rest of the chapter on embryology has been simplified. Modern chemical concepts are introduced throughout the physiological sections, and the chapter on classification enlarged by inclusion of nontaxonomic information with each of the major groups. This is a fine and readable work, for either teacher, student or layman. Pp. xiv, 417; figs. 298. McGraw-Hill Book Co., Inc., 330 West 42d St., New York City, $3.50.

A pioneer book in a new branch of science is indeed a rare event in this day, and when that field happens to include the microscope, the interest for this department is magnified. We looked up the word "pedology" in the dictionary in order to get at its etymology and found two definitions having to do with child study. Not until we turned to the section on new words did we find "the scientific study of soil." *Micropedology,* by Dr. Walter L. Kubiëna, formerly of Vienna and lately at Iowa State College, is a remarkable work on the microscopy of soil treated as a separate science in its own right, and not simply from the standpoints of soil particles as mineral or microorganisms in soil.

Part I deals with the principles of this new science, II with its techniques, III with soil fabrics, and IV with biological considerations. The instruments that one either makes or purchases for this work range from simple and inexpensive to very elaborate and ingenious, and the microscopist who has never tried this field will be greatly interested by the types of microscopes and illuminants employed. Likewise the author's classification of various soil fabrics constitute an important advance. The work is very well written and organized and the illustrations are splendid and interesting. The field is new and a fertile one to adopt by those wishing a research interest.

Any microscopist can read this volume with pleasure and profit. It is especially significant for the geologist, agriculturist, soil conservationist, and soil microbiologist. Pp. xvi, 243; figs. 132. The Collegiate Press, Inc., Ames, Iowa, $3.00.

A. S. A. M. News and Notes

At this writing, two additional milestones have been passed in the accomplishments of the American Society of Amateur Microscopists: *Bulletin 5* has gone to press, and membership has passed the one thousand mark.

The new *Bulletin* includes material that we feel certain will interest all classes of members. One of the feature articles is on motion photomicrography, by Benton A. Wheeler, of Little Rock, Ark. The author brings his skill as an engineer to the designing of homemade appliances whereby any form of motion picture camera can be hitched to the microscope, making possible reels of film on the lives of microorganisms. Other articles deal with ordinary photomicrography, with homemade accessories, methods, technique, and the studying of special classes of materials.

The present membership of the Society is 1003, representing 43 states, 4 territorial possessions, 6 Canadian provinces, and 3 other foreign countries. There are two affiliated societies and eleven chapters, several of which have their own publications.

A considerable number of our members are now in service, the A. S. A. M. being represented among Uncle Sam's forces on land and sea and in the air. In several cases the scientific knowledge acquired by these members has been put to such uses as aerial photography and gunnery.

Of special interest is an announcement that new books have come from the pens of each of the Society's officers. President Simon Henry Gage has just seen the issuing of the seventeenth edition of his famous work, *The Microscope,* most important of American volumes on the subject, while Secretary Julian D. Corrington's *Working With the Microscope,* a manual of technique for readers of all ages and covering all fields, is scheduled to appear on just about the same day as this issue of Nature Magazine.